THE

JOURNAL OF GAS LIGHTING,

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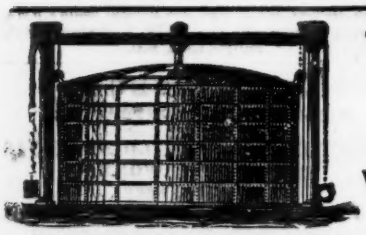

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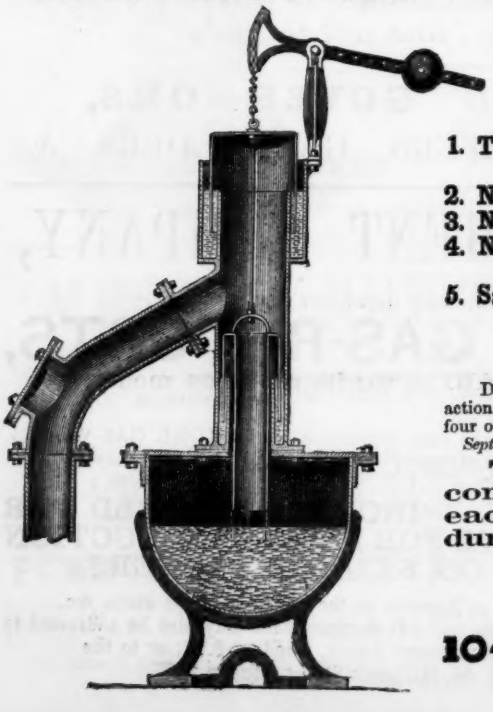

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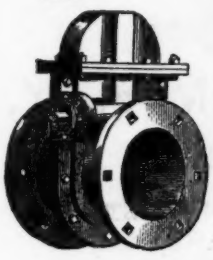

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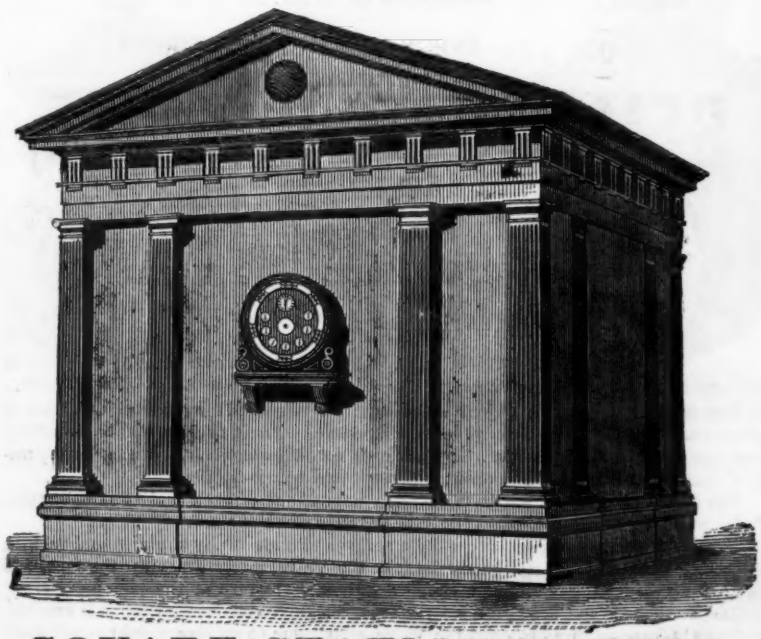

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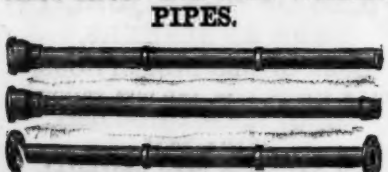

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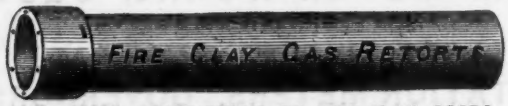
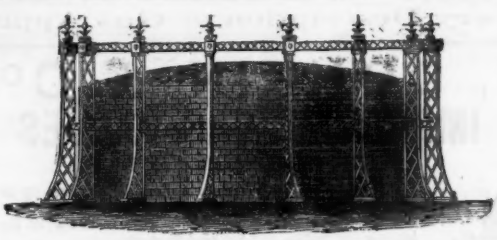


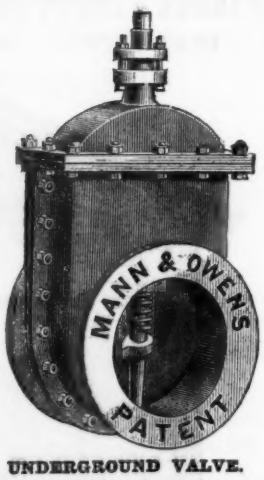
AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

MANN & OWENS' PATENT GAS-VALVE.

EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.



VALVE, with Indicator for Above Ground. UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:
S. OWENS AND CO.,
HYDRAULIC AND GENERAL ENGINEERS,
WHITEFRIARS STREET, LONDON, E.C.
PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

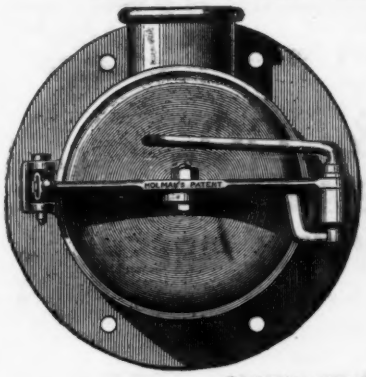
TANGYE BROTHERS AND HOLMAN,

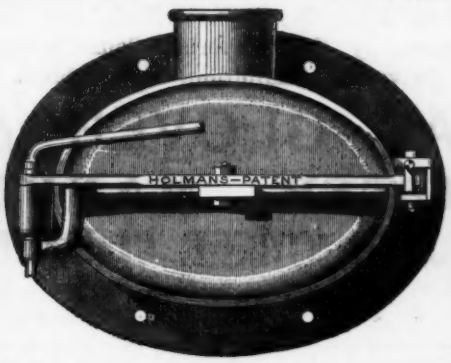
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

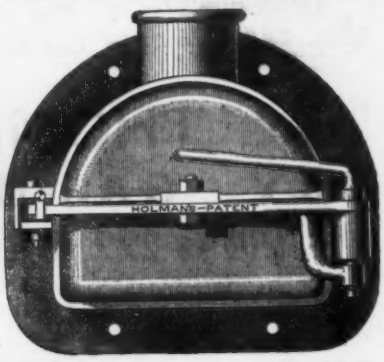
SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.







Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), being now in use in nearly all the principal Gas-Works in London and the Provinces.

Messrs. T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT ITSELF (see Illustrations above), instead of, as heretofore, bringing the Mouthpiece from the D or Oval at back to Circular in front.

D and Oval Morton's Lids have now been working satisfactorily for the past two or three years, both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

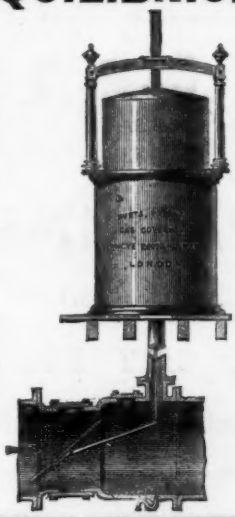
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

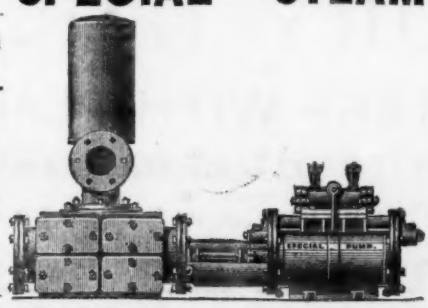
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

F. C. S.—*Received with thanks.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, DECEMBER 4, 1877.

Circular to Gas Companies.

THE *Gazette* notices which we publish in another column inform us that thirty-eight Bills, in relation to gas undertakings, will be promoted in the next session of Parliament. Of these twelve contemplate the sale and transfer of undertakings to local authorities. In connection with these there are two or three competing Bills promoted by Companies which will, no doubt, give rise to contests before committees. But the cases are of no great importance, and, so far as gas undertakings are concerned, we may infer that parliamentary business in the next session will be dull. The most important sale that will be authorized will be that of the Leicester Company; but, in this case, the terms have been settled by agreement, and we presume the Bill will be uncontested. The Limerick purchase has also been arranged, and the United General Company will disappear from the scene at the end of the session. The Bills that may be contested are really unimportant. It is impossible to foretell the disposition of the committees who may have to decide on these Bills; but, having regard to prevalent notions, we may expect that twelve more Gas Companies will cease to exist. We consider that this will be a misfortune; but it is impossible to stem the tide of public opinion. Perhaps a year or two may see a revulsion of feeling, and sounder notions may prevail At present we can only regret the gradual disappearance of Gas Companies. Besides the Bills enumerated above, there are twenty applications by Gas Companies and Local Authorities for Provisional Orders, four of which involve questions of purchase; but these also are small matters. The principle is, however, the same. We have no special objection to the system of co-operation, which constitutes the basis of these transfers; but it may be remarked that co-operation tends to reduce all to a dead level. There is no scope for enterprise, and but little inducement to exertion. If a man gets ten per cent. for his money, he can afford to spend ten per cent. If he only gets three and a half and four per cent., that is all he can disburse. The people who make an outcry against what they call exorbitant gas profits overlook the fact, that these inevitably come back to the public in some shape or other, and add to the circulation of wealth.

It will be observed that no notice by any Metropolitan Gas Company is given this year. The great "Sulphur" Question will therefore be left for the present as it stands. No new Act is, of course, required to effect the general amalgamation which we deem so desirable, and therefore the absence of any notice must not be regarded as a proof that no disposition to amalgamate exists. What the Board of Trade may do, or attempt to do, in the course of the next session, it is, of course, impossible for us to say, but we do not anticipate any sensational legislation on their part. They have probably had enough of the gas business, and after the success of the new Standing Orders of last session, they may be content to rest. Those Standing Orders will, of course, give a special colour to the Bills of next session. There are only one or two cases, so far as we can gather at the present moment, in which the auction clauses are likely to be omitted from the Companies Acts, and these are unimportant. We take it that Gas Companies know the worst they will have to submit to, and all will now proceed smoothly.

The Directors of West Hartlepool Gas and Water Company are evidently far-seeing men. Our readers will observe that they are promoting a Bill which, among other things, is to give them a monopoly of the supply of artificial light, other than by the means of the distribution of coal gas. They had, of course, the electric candle in contemplation, and seemed to suppose that this would soon compete with gas. The supposition was absurd, but no one will blame the Directors for taking Time by the forelock. We understand that the clause which would have conferred this extended monopoly has been withdrawn in deference to the opinion of a parliamentary agent, who believed it would never be sanctioned. We rather regret the course which has been taken. We would have preferred that the question should have gone before a parliamentary committee. Making what we before called a violent supposition, and conjecturing that electricity may some day supply household light, it follows that the plant of a Gas Company would at once become so much old iron and so many old bricks, and that shareholders without other resources would be candidates for admission to the workhouse. With these circumstances in view, we consider it nothing but reasonable that, in the event of the supersession of gas, a Company formed with power to supply that commodity should be allowed to change the form of their investment, and have the opportunity to furnish other sources of light. The question, however, need not be raised for a generation or so, and, when it is, it may be done by a Corporation who have committed their ratepayers to the payment of a large sum of borrowed money, which will have become useless. There appears to be a great deal of dissatisfaction with the Gas Company in West Hartlepool, and an indignation meeting has been held to protest against the price charged for gas. The misfortune is that a gas and water undertakings are combined, the latter producing but small profits, which have to be supplemented by extra profits on the gas undertaking. Three shillings and ninepence, doubtless, seems a long price to pay for gas in such a district as Hartlepool, but it appears to be necessitated by the circumstances. The Improvement Commissioners seriously threaten to strongly oppose the Bill promoted by the Company, but they may presently think better of it, and not waste the ratepayers money.

There is no pleasing some people. The Corporation of Halifax, as we have told our readers, some time ago reduced the price of gas, and immediately complaints spring up that the quality has also been lowered. Some changes, it would seem, have been made in the Council, and those who believe that an ever-changing body, like a Town Council, is ill adapted for the successful management of a gas undertaking, will note with satisfaction the fact that the grumblings at Halifax are associated with the alterations in the municipal body.

Among the notices for Provisional Orders, for which application has been made to the Local Government Board, will be found one to authorize the sale of the Ilkeston Gas Company to the Local Authority. The consideration agreed on, we understand, is £25,000 for the works, mains, and all other property of the Gas Company, and £500 to recoup the Company for the law expenses incurred in their opposition to the Board's applica-

tion for a Provisional Order last session. A local paper *naïvely* expresses an opinion, that the profits of the undertaking will go far towards paying the interest and principal of the loan which will be necessary to purchase this hitherto successful undertaking. All we can say is, that if such profits are not amply sufficient for the purpose, the blame will rest with the Local Board. Gas is not likely to be cheaper in Ilkeston, and we do not see what advantage ratepayers will derive from the purchase.

On the application of the Directors of the Leicester Gas Company, the Town Council of the borough have agreed to pay the consideration for the purchase of their undertaking by the issue of capital stock, instead of the granting of annuities. This will be satisfactory to the shareholders, and will simplify the book-keeping of the Corporation.

Great dissatisfaction appears to be expressed at the price of gas supplied by the Rossendale Union Company, which is above the average in the surrounding towns and boroughs. The fact is always overlooked by the agitators, that differences must exist according to the area supplied, and the quantity consumed per mile of main. The Rossendale Company are not favourably situated, and the agitators ought to use some forbearance.

The "Sulphur" Question is continually cropping up in a variety of shapes. Recently, great complaints have been made of stenches emitted from the Ratcliff works of the Commercial Gas Company. We expect that these are gross exaggerations. That gas-works are not always so sweet as lovers of Eau de Cologne might desire, may be admitted; but that any emanations from them should be so offensive as to make a strong man vomit, we cannot believe. Other causes must have been in operation. Complainants of smells from gas-works ought to remember that, on the establishment, gentlemen with as 'cute olfactory nerves and as delicate constitutions as themselves, are continuously engaged. These do not suffer from the symptoms of which people at a distance complain, and for that reason we are inclined to give little heed to statements made by super-sensitive outsiders. We admit, however, that the escape of sulphuretted hydrogen from gas-works may be prevented, and we are glad to have the assurance that the nuisance lately complained of will not be repeated.

An excellent description has been given of the extensions made to the gas-works of the Corporation of Bolton, under the direction of Mr. Veevers, an abstract of which we publish to-day. By these additions the manufacturing capacity of the works is doubled, and Bolton, as matters look at present, has gas manufacturing accommodation sufficient for many a year. The works, so far as we are able to judge, without drawings, are admirably arranged and tastefully designed.

The threat of another prosecution hangs over the head of the Exeter Gas Company. Stenches still continue to emanate from the works, and neighbouring householders still continue to complain. When the Company acquire the additional powers they are now seeking, we sincerely hope the grounds for all these complaints will be removed. At the present moment the causes may not be easily remediable, but some additions to the works will, no doubt, obviate all the evils.

There seems to be some misunderstanding between the Mersey Dock Commissioners and the Liverpool United Gas Company as to the payment for the destruction of the landing-stage. It was arranged between counsel that the Gas Company should pay two-thirds of the estimated cost of reinstating the stage, amounting to about £120,000, and it seems to have been agreed that this sum should be paid off at the rate of £10,000 per annum. There appears, however, to have been some hitch in the business, which is not unravelled in the reports which reach us. All we know is that the Dock Board and the Gas Company have a dispute on hand, out of which they do not seem to see their way.

As our columns, and those of our contemporaries, show, the "Sulphur" Question continues to receive a good deal of attention at the hands of chemists, who, of course, are not agreed—first of all, as to whether sulphur, or rather the product of its combustion in the air, is or is not injurious; and, secondly, as to the best means of removing it from gas. We must leave time to settle the vexed dispute. If gas chemists cannot purify gas from sulphur, and if gas engineers cannot arrange apparatus in which the purification can be carried on without nuisance, the public must put up with the consequences. All we wish to see is both chemists and engineers doing their best, and we have not the least doubt as to what will be the result.

Explosion of Gas in Glasgow.—On the evening of Tuesday last, an explosion of gas occurred in the house of Robert Logan, Marquis Street, Bridgeton, in the east end of Glasgow, whereby his wife was severely burned. Mrs. Logan was about to light the gas in the kitchen, and, perceiving that there was an escape, she searched for the source, which she came upon unexpectedly, and an explosion resulted. The ceiling of the house was destroyed, and several panes in the window were blown out.

Water and Sanitary Notes.

Once more the question of the prevention of the overflow of the Thames has been under the consideration of the Metropolitan Board of Works, and again, in defiance of the recommendations of a parliamentary committee, and of public opinion, they have declined for the present to promote the only measure that is likely to be successful. Let the representatives of the Hampstead and Paddington Vestries say what they like, the question is metropolitan, and the expense of the works necessary for the prevention of the inundations must be borne by the whole Metropolis, which expense, when distributed, will be very small. It was very properly argued that the ratepayers of the outskirts of Lambeth have no more interest in the matter than the dwellers on Hampstead Heath or Highgate Hill, and, with equal propriety, it was observed that these ever-recurring floods are a public scandal. The Board have postponed action until too late, but we hope and expect that notice of a public Bill will be given to empower the Board to do the necessary work, at the cost of the whole of London.

The proposal of the Corporation of Liverpool, to appropriate the head waters of the Severn, is, as might have been expected, exciting opposition. The Severn Conservators exhibit some alarm at the prospect that, at certain seasons of the year, the volume of water in the river may be so much diminished that the salmon and other fisheries will be affected. It seems to us that, taking the full quantity that Liverpool may be supposed to require, sufficient compensation water may be afforded to keep the Severn in full flood. That, however, is a question for the engineers, and will, no doubt, be well considered. The importance of the matter to Liverpool is very great; but, as the Corporation are not promoting a Bill in the next session, there will be plenty of time to consider the objections raised by the engineer to the Severn Conservators.

Notices have been given of thirty-eight Water Bills, seven of which are to authorize the transfer of undertakings from Companies to Local Authorities; and also of nine applications for Provisional Orders. The most important of the measures about to be introduced are, of course, those of the Metropolitan Board of Works and of the Corporation of Manchester. We have said so much of the former that, beyond repeating an opinion that neither the Purchase Bill nor the Additional Supply Scheme is likely to receive the sanction of Parliament, we shall add nothing more. Manchester, we believe, will succeed with their Thirlmere scheme, more especially if provision be introduced into the Bill for giving a supply of water to towns along the line of the aqueduct. Both local and sentimental opposition seems to have ceased. Another of the lakes—Crummock Water—it is proposed to appropriate to the supply of Cockermouth. What engineering schemes this may involve we have not yet been told, but, whatever they may be, sentiment will interfere for the preservation and beauties of the Crummock Water. The Corporation of Exeter are apparently going to Parliament for power to effect a compulsory purchase of the existing Water Company, and also of one newly projected. Whether they will be resisted by the existing Company or not, and whether or not we shall have the decision in the Stockton and Middlesbrough case repeated, it is hard to say. These are days of confiscation, and Parliament has sometimes but little respect for the independent rights of companies. The Corporation of Cheltenham are also about to confiscate the Water Company. There is in this case, we believe, no complaint either of the quantity or quality of the water supply, and the Corporation are without excuse. Nevertheless, if the Company are willing to part with their undertaking, and can obtain good terms, they might save an expensive parliamentary contest by making an agreement with the Local Authority. The Corporation of Scarborough will go before Parliament with a wide scheme for buying up, by compulsion or otherwise, all the Water Companies in and around their district. There seems a possibility that some agreement may be come to between the Scarborough Company and the Corporation. Nottingham, too, is about to make another attempt to get possession of the Water Company, and may, perhaps, this time, succeed, notwithstanding the fact that the Company give an ample supply of some of the best water in the kingdom, and that the undertaking is managed with great liberality. There are two or three competing Bills, some of which seem to have a bogus-like character; but until they are deposited, and we see them, it is impossible to form a correct estimate of their merits.

A comprehensive scheme has been devised on paper for supplying South London, and an enormous surrounding district south of the Thames, stretching from Penge to Esher, and including Kingston and Richmond, with spring water from

a well, or wells, at Tooting. The promoters, we imagine, can hardly be serious, and it will be noticed that they seek power to dispose of their undertaking, or any part of it, to any existing Company or Local Authority.

The cost of a Provisional Order and a preliminary inquiry has been revealed in some proceedings before an Inspector of the Local Government Board, recently held at West Houghton, the Local Board of which district last year obtained an Order authorizing them to construct water-works. The cost incurred in the course of the proceedings amounted to £2140, which they now ask for a loan to defray, just about half the amount being made up by a lawyer's bill, respecting which the inspector hesitated. He raised, however, a still stronger objection to some geologists fees, amounting to £146. In a water inquiry the services of chemists and geologists are as essential as those of engineers and lawyers, but Lieut.-Colonel Cox thinks he can do without them. There are some peculiarities in this case, but the money will, no doubt, be granted. This expenditure will, however, serve as a warning to Local Boards ambitious to construct water-works.

LIGHTING BY ELECTRICITY.

The Electric Light is, at the present moment, attracting so much attention, in consequence of it being supposed that it will one day supersede the use of gas for the purposes of public and domestic illumination, that we gladly avail ourselves of the kindness of an eminent gas engineer, who has given much attention to the subject, to place before our readers a *résumé* of the history of lighting by electricity.

The discovery of the voltaic battery brought with it the power to produce the phenomenon of light between two carbon points, when so arranged as to form a part of the circuit of a powerful combination. The development of a spark of intense luminosity is generally illustrated by mounting two pieces of hard, well-burnt charcoal in such a manner that one can be cautiously moved horizontally to or from the other, taking care at the same time that they remain attached, one to each of the conductors leading from the poles of a battery. Thus:—

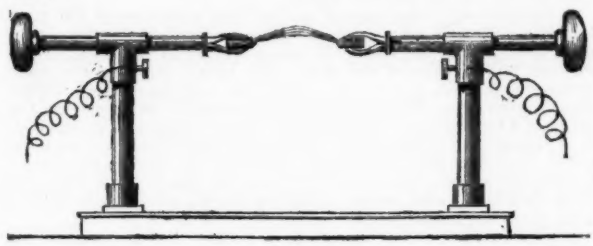


Fig. 1.

The flame spanning the space is always decidedly arched, and this circumstance induced the early experimenters to call it the "voltaic arc," a name that has been retained to the present time, and is often used when reference is made to the manifestation of light between electrodes, whether the distance be great or small, and whether they be placed horizontally or otherwise. The cause of the arched form, when the carbons are horizontal, is due to the ascentional tendency imparted to the air in the vicinity of the light by the heat evolved during the continuance of the spark.

One important condition to be observed in connection with the starting of this experiment is that the carbons must be kept in contact until visibly fired. They are then gently drawn asunder, and a flame appears, which will increase in length as the space widens, up to a point somewhere within the "striking distance." This point must not be exceeded, or an interruption of the current takes place, and the light is lost. To recover the light the tedious operation of bringing the carbons together again, and the distancing of them afresh, will have to be repeated as often as this mishap occurs; in fact, it is not possible to keep the flame reasonably uniform by any amount of attention on the part of the operator. He might succeed in maintaining it, in a measure, for some time, but it would be at the expense, almost, of his eyesight.

This difficulty arises when a battery is used, from the ever-varying power of the current, and the wearing away and consequent shortening of the carbons. The first difficulty, to a great extent, is remedied in practice by the means now employed for generating the electric force; and the adjustment for the wasting of the carbons, which is as much required as ever, is to an extent accomplished now by machinery.

This reduction of the carbon terminals was early observed to be due rather to the transfer of the matter of the positive to the negative electrode than to anything like the process of ordinary combustion. If we quote Mr. Grove, we shall see that Davy noticed this disintegration. Mr. Grove says, "When we see dazzling flame between the terminals of a voltaic battery, do we see electricity, or do we not rather see matter detached, as Davy supposed, by the mysterious agency of electricity, and thrown into a state of intense chemical or mechanical action?" Mr. Noad calls attention to an interesting experiment of Mr. Daniel's, with one of his batteries of 70 cells, that refers to this also. (Transactions of Royal Society, 1819.) This combination "gave between charcoal points, separated to a distance of three-quarters of an inch, a flame of considerable volume, forming a continuous arch, and emitting radiant heat and light of the greatest intensity. The latter, indeed, proved highly injurious to the eyes of

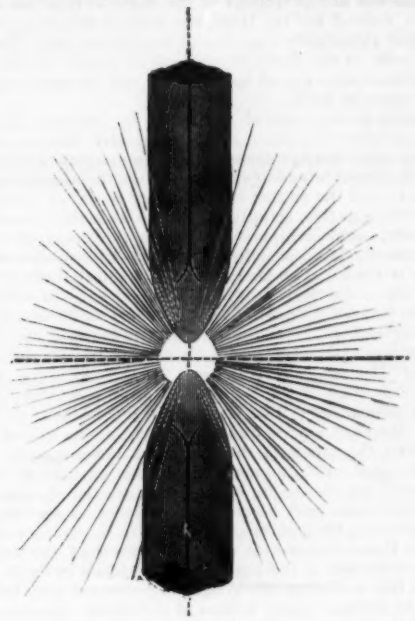


Fig. 2.

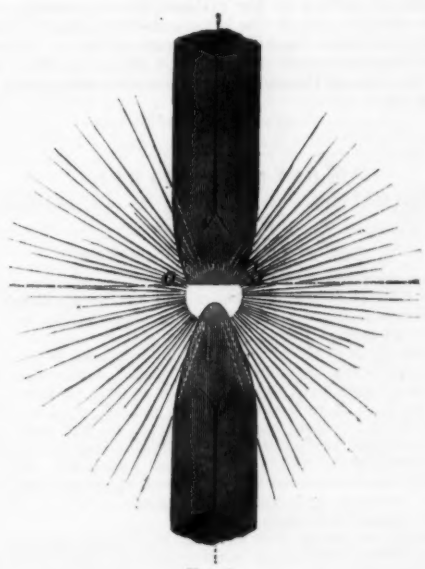


Fig. 3.

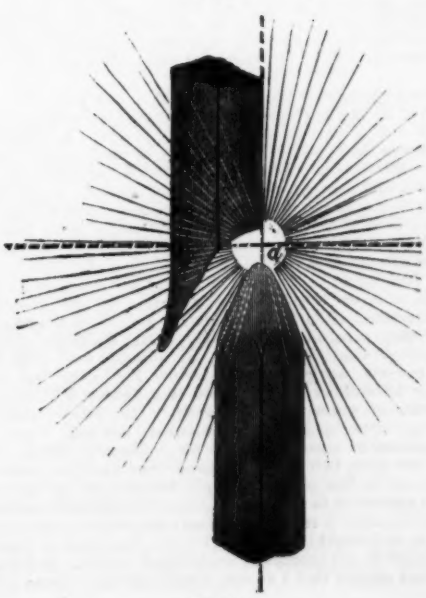


Fig. 4.

spectators, in which, although they were protected by grey glasses, of double thickness, a state of very active inflammation was induced; the whole face of Mr. Daniel became scorched and inflamed, as if it had been exposed for many hours to a bright midsummer sun." "The phenomenon of the transfer of the charcoal from one electrode to the other, noticed by Dr. Hare, but first observed by Professor Sillimann, was abundantly apparent; taking place from the zincode (or positive pole) to the platinode (or negative pole)." In this experiment the carbons were placed horizontally, and the necessary adjustments were made by hand.

This transfer is very marked *in vacuo*. In this case, the carbons are placed one above the other, as in the electric lamp, a powerful current being sent through them, and a conical-shaped cavity being formed in the upper or positive carbon by the disintegrating power of the current; and the matter so displaced flies in an intense state of fusion to the negative, or lower electrode, and there accumulates in a solid body, equal in capacity to the cavity formed by its expulsion. This proves that the light is not due to combustion. That this transfer is the same in air, practice abundantly proves by what takes place where the electric light is in actual use. In confirmation, we cannot do better than quote from the reports of Professor Tyndall and Mr. Douglas, C.E., "On the Comparative Trials of the Dynamo-electric Machines of Gramme and Siemens, and the Magneto-electric Machines of Holmes." Mr. Douglas says, "With the magneto-electic machines in use at the South Foreland and southern point the currents are alternating;" that is, upwards one moment of time and downwards the next, say, in round numbers, at the rate of 100 per second. "And the points of the upper and lower carbons are consumed at an equal rate; moreover, they both partake of the same pointed form," as shown in fig. 2. "With the dynamo-electric machines of Gramme and Siemens, the current is continuously in one direction—viz., through the top carbon to the bottom one. The top carbon is thus consumed at a greater rate than the bottom one, and a crater is formed in the top carbon, as shown in fig. 3. It will thus be seen that a portion of the light is prevented from being fully utilized in the extreme upper prisms of a dioptric apparatus by the edge, *a b*, of the crater." "In order to avoid this loss, and obtain the maximum of light from the carbons, they are usually so placed in the lamp that the axis of the bottom carbon is nearly in the same vertical plane as in the front of the top carbon, fig. 4. This arrangement is said to give a much steadier light than any other, in consequence of the current through the upper carbon being held steadily at the front edge, *a*."

(*To be continued.*)

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE STEAM-JET EXHAUSTER.

SIR,—I am sure that Mr. Duncan Jeffrey, who read the paper upon the Cleland-Körting steam-jet exhauster, as well as the members of the West of Scotland Association of Gas Managers who subsequently joined in the discussion thereon, did so only from the best of motives, being desirous either of giving or of receiving information. Such, at least, was the case so far as the writer is concerned. I regret exceedingly, therefore, to observe that, from the spirit of Mr. Cleland's letter in your issue of Nov. 13, such was evidently not his opinion. He blames me therein for reiterating statements which he had previously corrected, with taking credit for what did not belong to me, and generally characterizing the statements made as unfounded. What motive could possibly have prompted the writer, and the other members of the Association, to make such unfounded statements will be best left to Mr. Cleland himself to explain.

There can be no doubt that an exhauster which continues working, whether gas is being made or not, causing explosions, and producing liquor which has to be given away for nothing, is a fearful and a wonderful phenomenon; yet, from mechanical defects, such was the character of the steam-jet exhauster supplied to Mr. Jeffrey, and such (*minus* the explosions) has evidently been the instrument supplied to others. This is incontestably proved by Mr. George Anderson's letter in your issue of Nov. 6.

Mr. Cleland appears to be of opinion that the mechanical defects complained of by Mr. Jeffrey are so evident that any ordinary mechanic might, with instructions from him, have put them to rights at once. In this, however, he is seemingly mistaken, or surely a gas engineer so eminent as Mr. George Anderson, of London, would have remedied those defects, and prevented his exhauster insanely producing useless ammoniacal liquor, at the rate of 60 gallons per ton of coal distilled.

In your issue of March 23, 1875, you published a letter from Messrs. Körting Bros., wherein they say: "The quantity of steam used with our jet exhauster is very small—two quarts of water to be evaporated per 1000 cubic feet of gas delivered per hour; in fact, so little that its effect is entirely different from that of the jet exhauster of older constructions without the regulating slide;" and again, in yours of Nov. 13, they give, on the authority of Mr. Whitaker, the manager of the Wakefield Gaslight Company, the quantity as double that previously given—viz., one gallon of water per 1000 cubic feet of gas exhausted (or 10 gallons per ton), and that against a back pressure of only 8 inches of water. Mr. Anderson, on the other hand, uses just *six times* the latter quantity, or 60 gallons per ton. Now, why is it that the quantity of steam required for exhausting differs so much? If, in the one case, two pints of steam converted into water are sufficent, why not in the other? Simply because, in the one case, the steam is so applied as to develop its greatest energies in exhausting the gas, and in the other it is not so applied; the reason being that the jet exhauster, as at present constructed, has not the power of automatically adjusting itself to the amount of work which it has to perform.

Mr. Cleland alleges that I do not explain in what sense I can have pointed *out* things which were described, published, and practised years before I pointed *to* them. The sense, I apprehend is almost self-evident. I simply pointed out that the facts and improvements suggested, if previously well known and practised, were certainly not taken advantage of in the construction of the jet exhauster supplied by Messrs. Körting Bros., and that by the simple application of such facts and suggested improvements, the steam-jet exhauster would be made better suited for the work required of it, more especially in small works, where the make of gas was liable to be very variable.

Mr. Cleland appears to imagine (at least, he would lead your readers to believe) that the jet exhauster at present supplied is provided with all the necessary appliances for adjusting the relative sizes of the steam-jet orifice and the gas orifice, in order that the steam may be used with the greatest economy. He says that special means are provided to accomplish that object, both in the original Cleland and in the Cleland-Körting exhauster; and that when, in my letter to you of December, 1875, and again at the Helenburgh meeting of the West of Scotland Association of Gas Managers, I pointed out that an arrangement could be made by means of which both the steam-jet orifice and the gas orifice could be adapted to the make of gas, I was suggesting an arrangement which was impacticable, and which he had, in his letter in your issue of Dec. 21, 1875, pointed out and explained to be so. I need scarcely say that neither in the former nor the latter of these statements am I at one with Mr. Cleland, or I should not have made the statement spoken of at the Helensburgh meeting.

In order that a jet of steam may be employed with its maximum effect for exhausting gas, it is essential, with a given pressure of steam and a given back pressure, or resistance of the gas to be forced, there should be a fixed relation between the sizes of the orifice to supply the steam to force the gas, and the orifice through which the gas is to be forced; that an increased quantity or make of gas calls for a proportionately increased size of both steam-jet and gas orifices; and that, on the other hand, a diminishing yield of gas necessitates a decrease in both orifices. Also, an increase in the amount of gas resistance, whether as pressure on the outlet side of the exhauster or vacuum on the inlet side, calls either for an increase in the proportionate size of the steam orifice to the gas orifice, or a proportionate reduction in the gas orifice to the steam orifice of the exhauster. Again, an increase in the pressure of the steam calls for a reduction of the steam orifice in proportion to the size of the gas orifice. It is equally evident that, in order that the steam may be used under those fixed conditions, the steam orifice must always be supplied with steam of a given pressure, and this can be accomplished only by having the quantity of steam regulated at the point of issue.

Experience has shown that those relative conditions cannot be very much departed from without entailing considerable loss of the exhausting power of a given weight of steam.

In no gas-works is the make of gas per hour continuously the same for any considerable period of time. More especially is this the case in small works, where the make will frequently vary to the extent of 100 per cent. in the course of the twenty-four hours. Further, the make during the Sabbath, even in large works, is now, in many cases, smaller than on week days. The Cleland-Körting steam-jet exhauster has the means of adjusting the relative sizes of the steam-jet and gas orifices, so as to pass any given number of thousands of cubic feet of gas per hour, and at convenient periods of the year the orifices are fixed approximately to the make of gas, the necessary quantity of steam being regulated by a throttle-valve on the pipe supplying the jet, and is actuated by a small governing gasholder.

Now, with such an instrument, it is evident that as long as the pressure and quantities of gas and steam remain at that for which the instrument has been set, so long will full power be obtained for the steam employed; but suppose that the make of gas were to fall short of the quantity for which the instrument was set, two conditions would be produced, which would detract materially from the economic employment of the steam. First, the orifice through which the gas is to be driven being larger than that required, a proportionately larger quantity of steam will be required to do the work; and secondly, the steam being checked or regulated by the throttle-valve, the pressure at the orifice will be reduced. Consequently, the velocity of issue also necessitating an increased weight of steam to produce the same exhausting or forcing effect, and *vice versâ*, when the make of gas is greater than the exhauster is set to pass, an increased pressure, and, consequently, weight of steam, is needed to overcome the extra force required to drive the gas through the contracted gas orifice.

These defects, in the constructien of the steam-jet, I proposed should be remedied by a synchronous and proportionate adaptation of the relative sizes of the steam-jet and gas orifices to the make and pressure of the gas, by means of a lever, or other mechanical device, attached to the governing gasholder, and that, in order that the steam should be employed with its maximum effect, it should be regulated by a needle working in its point of issue.

Mr. Cleland says he showed this suggestion to be impracticable, because any alteration in the amount of back pressure calls for an alteration in the proportionate sizes of the steam-jet and gas orifices, and that such alteration could not be brought about by the same lever. Granted such to be the case, he must admit that, so long as no alteration does take place, all the other movements will be performed perfectly, and the steam much more economically employed; and a very little consideration will show that the other condition—viz., the proportionate decrease of the gas orifice to the steam-jet orifice, or *vice versâ*, a proportionate increase of the steam-jet orifice to the gas orifice, to suit alterations of back pressure—could be very easily accomplished by means of a float placed in a syphon on the pressure side of the steam-jet. This float could, by a link motion, or other mechanical means, alter the proportionate length of either the steam-jet needle or conical-valve movement to suit the make of gas.

Assuming, as I do, the practicability of such an improved exhauster, the "truism," that with the increase in the quantity of gas the velocity of the steam should increase, which Mr. Cleland asserts has been an essential feature of his exhauster from its birth, no longer holds good; for the exhauster, having now emerged from the stage of infancy, and become able to adapt itself to circumstances, it is immaterial whether the quantity of gas would be large or small, and the steam would be em-

ployed at its highest velocity, which undoubtedly is the most economical mode of applying it.

With regard to my statement that with the Cleland-Körting jet, when the gas orifice is not automatically closed, or any valve provided to prevent the air from flowing back from the gasholder, as much steam would be kept passing as would overcome the back pressure of the gasholder, &c., I consider this to be not a matter of opinion, but a matter of *fact;* and although Mr. Cleland expresses his surprise at the statement, it is, nevertheless, so perfectly self-evident (there being nothing between the gasholder and the holder which regulates the amount of steam to the jet), that, unless the steam were turned off by hand, it would do as I assert, that I consider it altogether unnecessary to make any further comment on the matter.

When I employed the word "impact," in referring to the advantage of using a jet of steam of high velocity, I did so because at the time it was the best that suggested itself to my mind by which I could convey the idea. I am ready to admit that impact between the molecules of the two moving streams of gases may not be the sole means of communicating motion from the rapid to the slow-moving stream of gas—that cohesion and the law of diffusion each plays a part; yet I am by no means disposed to admit that the word "impact," when applied to the union and commingling—not intermittent, but continuous—of two streams of gas or vapour proceeding in the same direction, is altogether inappropriate and misleading.

It is now a well-known and widely-applied fact that the lower the pressure and the slower the speed with which a stream of one gas issues from an orifice into another gas, the farther it will travel before commingling—as instanced in the improved gas-jet, where it is an object to prevent an over or too rapid commingling of the atmosphere, the pressure is reduced to the lowest possible point consistent with a proper form of flame—and, on the contrary, the higher the pressure, and the greater the velocity with which one stream of gas or vapour issues into another, the shorter distance will it travel before commingling. Now, to my mind, it is inconceivable that cohesion and diffusion alone produce these results; but that it is rather the *impact* of the molecules of rapidly-moving gas into and against more slowly-moving gas.

When a jet of highly-compressed steam or gas escapes from an orifice at a high velocity, it can be easily conceived that its molecules will partake of two motions—the major one being directly forward, due to the propulsion of the recoiling molecules from behind, and the minor being a lateral oscillating motion, produced by the alternate recoil and attraction of the molecules of the suddenly-released stream of compressed steam or gas. These combined forward and lateral motions would produce a wavy movement of the external surface of the jet, causing the molecules of the rapidly-moving steam or gas to be impacted into and against, and commingled with, the molecules of the surrounding gas; and as the molecules of the gas so impacted and commingled with the motive gas or steam would partake of its forward motion, the attraction of cohesion would cause other gas molecules to flow forward to take their place, and thus lateral induction be brought about.

I may be wrong as to the use of the term "impact" and the action of the steam-jet; but the theory is quite as feasible as any other which I have seen recorded; and did time, and the space in your valuable JOURNAL at the disposal of your correspondents, permit a lengthier letter, many analogous illustrations might be given of the physical action amongst liquids and gaseous fluids indicative that the theory I have dared to advance is not altogether misleading.

Possibly at some future meeting of the West of Scotland Association of Gas Managers, the steam-jet, its mode of action, &c., may be treated of in a paper by some of its members; or, better still, perhaps Mr. Cleland may, like our London friend and honorary member, Mr. Sugg, honour us himself with a paper on the subject, and assist in the discussion. I am satisfied, and will make bold to say, that if he does so, he will find the members of that Association thirsting after a higher knowledge of matters pertaining to their profession, and that they will give him a very hearty welcome for the sake of the valuable information which he will be able to communicate.

WM. YOUNG.

Clippens Shale Oil-Works, by Paisley, Nov. 20, 1877.

A VOLUMETRIC METHOD FOR ESTIMATING SULPHUR IN COAL GAS.

SIR,—Your correspondent, Mr. W. C. Young, urges against my method for volumetrically estimating sulphur in coal gas, objections which I do not, in practice, find to exist to such an extent as to vitiate results. The only one of the objections that Mr. Young makes, which I admit to have any weight, applies, as I will show, equally to Messrs. Sadler and Silliman's, Mr. Young's, and my own methods—it is the excess of sulphur shown by volumetric over gravimetric method, and which is clearly due to nitrogen acids. I will, however, take Mr. Young's objections in the order in which he has advanced them.

1. With regard to the formation of nitrogen acids through the presence of ammonia vapours. By placing the ammonia, to be used to fix the sulphuric acid, above the region of combustion, I avoid error from this cause. There is now ammonia in the atmosphere, ammonia in gas, and compounds containing nitrogen in the gas. Now I contend that the three volumetric methods described this year in your columns are all equally liable to error from this cause. It is, of course, usual to remove the free ammonia in the gas or inlet of the meter. Messrs. Sadler and Silliman, in their exhaustive description of their method, state that the average excess of sulphur, per 100 cubic feet, by their method over the gravimetric mode to be ·27 grain, and this after all precaution had been taken to avoid the formation of nitrogen acids. I find ·2 of a grain, and have stated so in the description of my method, to be the excess of sulphur found, and which is clearly due to nitrogen acids. Mr. Young, in the description of his process, makes no mention of the formation of nitrogen acids, which he has evidently overlooked, but states the 8 per cent. excess by his method over that used by the Gas Referees must be due to the sulphur in the gas. If this be so, Messrs. Sadler and Silliman and myself have formed wrong conclusions. After avoiding, by all practicable means, the formation of nitrogen acids, I have found their presence in minute quantity, and I am of the opinion that all of the 8 per cent. excess of sulphur found by Mr. Young in his process, to be due to other causes than the sulphur in the gas. The question of the formation of these nitrogen acids is one of interest. As shown by the experiments of the two American chemists and my own figures, their formation is in an inverse ratio to the rate of burning. In cases where the combustion is imperfect, no nitrogen acids are formed, and part of the sulphur being only oxidized to the extent of sulphurous acid.

2. The objection taken by Mr. Young, on account of loss by bubbling, is at once met by referring to my description of the process where I direct a watch-glass to be placed over the beaker. A flask would but partially meet the difficulty, if there be any difficulty on this score. I do not believe it exists in practice. But I use the watch-glass in deference to the opinion of the Gas Referees in their Instructions to the Gas Examiners.

3. With regard to cochineal as an indicator, I quote the following sentence from page 30 of Sutton's "Volumetric Analysis:"—"This indicator possesses the advantage over litmus that it is not so much modified in colour by the presence of carbonic acid." The opinion of chemists whom I have questioned on the subject, and my own experience, more than confirm this statement in Mr. Sutton's valuable work. Speaking from experience, I can only say that cochineal *can* be used with perfect safety for the purpose in question.

4. The suggestion about possible impurities in carbonate of ammonia, and the objection to its use on this account, might with equal justice be brought against every process in the domain of analytical chemistry, if it were not a natural inference that the reagents to be used should be as free as possible from impurities likely to interfere with accurate work. That it is at least free from sulphate is evident, or Mr. Young would not use it in the manner indicated. The common carbonate of ammonia is singularly pure for a commercial salt. What the impurities are that are likely to affect results I do not know, not having met with them yet. The eduction-pipe, as I stated before, is really superfluous, and can be removed without detriment to results.

LEWIS T. WRIGHT.

23, *Sutherland Gardens, W., Nov.* 20, 1877.

NAPHTHALINE.

SIR,—I am compelled to reply to Mr. Henry Aitken's letter, published in your number for Nov. 20, because it is necessary to state clearly the terms of the discussion it raises. Mr. Aitken, in effect, patented in 1874 a complete process of gas manufacture, which gives excellent results where it is adopted. In order that this process, which consists in enriching gas by means of the vapour of tar or oil, may produce the desired results, the gas has to be dried, and this drying of the gas is specified in Mr. Aitken's patent as producing a higher illuminating power, by enabling the gas to absorb or retain the hydrocarbon vapours.

The discovery of this latter fact is not, however, due to Mr. Aitken, and he cannot claim for himself any special right to it, inasmuch as in the First Report by the London Gas Referees to the Board of Trade "On the Construction of Gas-Burners with Reference to the Principles of Gas Illumination," dated June 22, 1871, from which I have given an extract in my paper published in the JOURNAL for Sept. 25 last, it is established that the drying of the gas increases its illuminating power from 6 to 8 per cent.

It was, therefore, neither Mr. Aitken nor myself who first demonstrated this fact of the augmentation in the illuminating power of gas by its desiccation, but an official report, the authority of which Mr. Aitken will readily admit. Consequently, he cannot take one portion of his patent, which forms a complete process, and bring it forward in opposition to me, when I have never claimed the priority of its discovery, but, on the contrary, have indicated its origination, in the report above referred to, three years anterior to Mr. Aitken's patent.

L. BRÉMOND.

Versailles, Nov. 24, 1877.

OXIDES OF IRON.

SIR,—I notice that a question has arisen as to what oxides are suitable for the purification of gas. The following experience may be useful to your readers.

Some 18 or 20 years ago I was using Hills's oxide in purification. It was getting spent, and at that time spent oxide was a waste product. It occurred to me to roast the oxide, drive off the sulphur, and so use it for ever, or as long as I had any oxide to manipulate.

A chemical authority told me: "That won't do; the oxide you have is hydrated. If you submit it to a red heat, you will drive off all the water, and render it anhydrous, when it will be unfit for purification."

I built a kiln, and roasted the spent oxide; this took quite twelve hours at a dull red heat, and I could have collected the sulphur had I considered it worth while. I afterwards spread the oxide on a floor, added wood sawdust, watered it, and turned it two or three times, and in this manner I continued for years without purchasing any more oxide. I found it was not so effective the first, or even the second, time as it was afterwards. The conclusion I came to was that the oxide changed from anhydrous to hydrated by moisture and exposure to the air.

From the foregoing I argue that iron in any form can be brought into condition to purify gas. It is simply a commercial question as to in what form it can be obtained cheapest.

GEORGE ANDERSON.

35A, *Great George Street, S. W., Dec.* 1, 1877.

FORM OF GAS COMPANIES ACCOUNTS.

SIR,—Kindly permit me, through the medium of your JOURNAL, to inform the very numerous applicants for copies of my balance-sheets that I have already sent off all the copies in my possession. I hope, on Tuesday next, to receive a fresh supply from the printers, and in course of the ensuing few days applicants may rely upon receiving a copy.

Gas Offices, Guildford, Dec. 1, 1877. WILLIAM LONGWORTH.

INSTITUTION OF CIVIL ENGINEERS.—At a meeting of the Institution, on the 27th ult., it was notified that Mr. Jabez Church, of Westminster, had been transferred from the class of associate to that of member.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CLI.

Tables of the Discharge of Gas in Cubic Feet per Hour, through Pipes of various Diameters and Lengths, at different Pressures (*continued*).

By Thomas G. Barlow. Extended by Thos. Newbigging.

(The specific gravity of the gas is taken at ·4, air being 1.)

Diameter of Pipe, 18 Inches.

Length in Yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 inch pressure	41,400	33,800	29,400	23,900	20,700	18,400	16,900
" " 0·2 "	58,800	47,800	41,400	33,800	29,400	26,200	23,900
" " 0·3 "	71,800	58,800	50,800	41,400	35,900	32,100	29,400
" " 0·4 "	82,800	67,600	58,800	47,800	41,400	36,800	33,800
" " 0·5 "	92,600	75,700	65,600	53,500	46,300	41,400	37,850
" " 0·6 "	101,476	82,800	71,800	58,800	50,800	45,400	41,400
" " 0·8 "	117,223	95,790	82,800	67,600	58,800	52,300	47,800
" " 1·0 "	131,220	106,725	92,728	75,700	65,600	58,800	53,500
" " 1·2 "	143,467	117,223	101,476	82,668	71,733	64,254	58,611
" " 1·5 "	161,400	131,220	113,636	92,728	80,000	71 800	65,600
" " 1·8 "	175,834	143,467	124,221	101,476	87,917	78,732	71,733
" " 2·0 "	185,457	151,340	131,220	106,725	92,728	82,800	75,700
" " 2·5 "	207,327	169,273	146,529	119,410	103,663	92,728	84,500

Diameter of Pipe, 20 Inches.

Length in Yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 inch pressure	54,000	44,000	38,250	31,200	27,000	24,200	22,000
" " 0·2 "	76,500	62,400	54,000	44,000	38,250	34,200	31,200
" " 0·3 "	93,500	76,500	66,100	54,000	46,750	41,800	38,250
" " 0·4 "	108,000	88,000	76,500	62,400	54,000	48,400	44,000
" " 0·5 "	120,500	98,800	85,300	69,800	62,250	54,000	49,400
" " 0·6 "	131,760	108,000	93,500	76,500	66,100	59,100	54,000
" " 0·8 "	152,280	124,200	108,000	88,000	76,500	68,400	62,400
" " 1·0 "	170,640	139,320	120,420	98,800	85,300	76,500	69,800
" " 1·2 "	186,840	152,280	131,760	108,000	93,420	83,646	76,140
" " 1·5 "	208,980	170,640	147,420	120,420	102,300	93,500	85,300
" " 1·8 "	228,960	186,840	162,000	131,760	114,480	102,060	93,420
" " 2·0 "	241,380	197,100	170,640	139,320	120,420	108,000	98,800
" " 2·5 "	270,000	220,320	190,620	155,520	135,000	120,420	110,200

Diameter of Pipe, 22 Inches.

Length in Yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 inch pressure	68,600	56,000	48,400	39,600	34,300	30,700	28,000
" " 0·2 "	96,800	79,200	68,600	56,000	48,000	43,400	39,600
" " 0·3 "	118,800	96,800	84 000	68,600	59,400	53,300	48,400
" " 0·4 "	137,200	112,000	96,800	79,200	68,600	61,400	56,000
" " 0·5 "	153,500	122,500	108,200	88,600	76,800	68,400	61,200
" " 0·6 "	168,577	137,200	118,800	96,800	84,000	75,000	68,600
" " 0·8 "	193,406	158,122	137,200	112,000	96,800	86 500	79,200
" " 1·0 "	216,275	176,418	152,895	122,500	108,200	96,800	88,600
" " 1·2 "	237,184	193,406	168,577	136,560	118,265	105,850	96,703
" " 1·5 "	265,280	216,275	187,525	152,895	132,000	118 800	108,200
" " 1·8 "	290,697	237,184	203,860	168,577	145,054	130,026	118,265
" " 2·0 "	306,444	249,598	216,275	176,418	152,895	137,200	122,500
" " 2·5 "	342,381	279,655	242,280	197,326	171,190	152,895	140,000

Diameter of Pipe, 24 Inches.

Length in Yards	500.	750.	1000.	1500.	2000.	2500.	3000.
Quantity delivered with 0·1 inch pressure	84,000	68,600	59,500	48,500	42,000	37,500	34,300
" " 0·2 "	119,000	97,000	84,000	68,600	59,500	53,400	48,500
" " 0·3 "	145,500	119,000	103,000	84,000	72,700	65,200	59,500
" " 0·4 "	168,000	137,200	119,000	97,000	84,000	75,000	68,600
" " 0·5 "	187,500	155,000	135,600	108,600	93,800	84,000	77,500
" " 0·6 "	208,396	168,000	145,000	119 000	103,000	92,000	84,000
" " 0·8 "	240,900	196,655	168,000	137,200	119,000	106,000	97,000
" " 1·0 "	269,049	219,283	189,734	155,000	135,600	119,000	108,600
" " 1·2 "	294,710	240,900	208,396	170,294	146,966	131,414	120,450
" " 1·5 "	329,702	269,049	233,280	189 734	163,000	145,500	135,600
" " 1·8 "	360,806	294,710	255,052	208,396	180,403	161,585	146 966
" " 2·0 "	330,946	311,040	269,049	219,283	189,734	168,000	155,000
" " 2·5 "	425,347	347,587	300,931	245,721	212,284	189,734	172,000

Diameter of Pipe, 26 Inches.

Length in Yards	750.	1000.	1500.	2000.	2500.	3000.	4000.
Quantity delivered with 0·1 inch pressure	85,000	73,500	60,000	52,000	46,500	42,500	36,750
" " 0·2 "	120,000	104,000	85,000	73,500	65,800	60,000	52,000
" " 0·3 "	147,000	127,000	104,000	90,000	80,600	73,500	63,500
" " 0·4 "	170,000	147,000	120,000	104,000	93,000	85,000	73,500
" " 0·5 "	189,000	165,000	134,000	116,000	104,000	94,500	82,500
" " 0·6 "	208,000	180,000	147,000	127,000	114,000	104,000	90,000
" " 0·8 "	240,013	208,000	170,000	147,000	132 000	120,000	104,000
" " 1·0 "	268,304	232,621	189,000	165,000	147,000	134,000	116,000
" " 1·2 "	293,857	254,615	208,072	179,782	160,617	146,928	126,851
" " 1·5 "	328,536	284,731	232,621	201,000	180,000	165,000	142,000
" " 1·8 "	360,385	312,109	254,615	220,666	197,121	179,782	156,054
" " 2·0 "	379,641	328,536	268,304	232,621	208,000	189,000	165,000
" " 2·5 "	424,359	367,777	300,245	260,091	232,621	213,000	184,000
" " 3·0 "	465,334	402,456	328,536	284,731	254,615	232,621	201,000

(*To be continued.*)

Parliamentary Intelligence.

NOTICES GIVEN FOR PRIVATE BILLS (SESSION 1878) RELATING TO THE SUPPLY OF GAS, WATER, Etc.

Bangor Local Board of Health.—Purchase by or vesting in local board of the Bangor Water and Gas Company's undertaking, property, and rights; confirmation and application to local board of agreements, &c., with Lord Penrhyn; power to local board to supply water and gas within company's existing limits, and also gas within parish of Llandegai; purchase of lands; construction of works; powers in connection with supply of water, and manufacture and supply, &c., of gas and residuals; rates, &c.; money powers; bye-laws; provisions for protection of water, &c.; sale or letting of lands; agreements with other authorities, &c.; amendment of Acts; dissolution of company.

Bangor Water and Gas.—Re-arrangement of loan capital and confirmation of mortgages, debentures, or other securities issued by the company; additional capital and borrowing powers in connection therewith; regulations as to fittings; incorporation and amendment of Acts, and other purposes.

Batley Corporation Water.—Revival of powers and extension of time for purchase of land compulsorily and otherwise for authorized works; alteration of water rates and rents, and imposition of new rates; alteration and increase of borrowing powers; new provisions as to sinking-fund; capitalization of interest on money borrowed for works whilst unproductive; payment of interest by coupons; compensation to mill-owners; application of purchase-money for the share and interest of the corporation in the Dewsbury, Batley, and Heckmondwike Water-Works; confirmation of purchase by the corporation of Brownhill Mills, and power to sell or lease same and other corporate property, and to apply purchase-money or rents; provisions as to rights of the corporation in relation to streams as owners of land; incorporation, repeal, extension, and amendment of Acts; and other purposes.

Bedlingtonshire Local Board Water.—Power to the local board to acquire by agreement or compulsion lands, easements, water rights, and other property, and to supply water within their district; to construct water-works; to amend the Local Government Board's Provisional Orders Confirmation (Aberdare, &c.) Act, 1875; and other purposes.

Bournemouth Gas and Water.—Increase of capital and borrowing powers; provisions as to supply of gas to public lamps; purchase of lands by agreement; recovery of charges for gas; incorporation of Acts; repeal or amendment of Acts.

Bradford Water and Improvement.—Construction, laying down, and maintenance by the mayor, aldermen, and burgesses of the borough of Bradford, of reservoirs, conduits, mains, and other water-works; alteration of existing conduits; extension of time for completion of water-works already authorized; extension of gas-works; compulsory taking of lands; to raise moneys required for lighting the public streets as part of the general district rate instead of by a separate lamp rate; incorporation, alteration, amendment, and repeal of Acts.

Brading Harbour District Gas.—Incorporation of company; power to erect works and to supply gas in the parishes of Brading and St. Helen's, in the Isle of Wight and county of Southampton; powers to Brading Harbour Improvement and Railway Company; power to levy tolls; incorporation and amendment of Acts.

Burton-upon-Trent Commissioners.—Powers to purchase or take on lease part of the undertaking of the South Staffordshire Water-Works Company, and to supply water in extended town; also to erect gas-works, purchase lands, raise money, and take further powers for gas undertaking; purchase of land by compulsion for gas-works; power for commissioners to borrow for purposes of the Bill, and to pay costs thereof; repeal, amendment, and incorporation of Acts.

Cardiff Water.—New reservoirs and water-works; purchase of lands and easements by compulsion and by agreement; impounding of water; supply of water in bulk; further powers as to repair of pipes and regulations for preventing waste; increase of share and loan capital; incorporation and amendment of Acts; and other purposes.

Castleford and Whitwood Gas.—Dissolution of the Castleford and Whitwood Gaslight and Coke Company, Limited; incorporation of new company; vesting in new company of undertaking of dissolved company; regulation of capital of new company; additional capital; maintenance and extension of works; manufacture and storeage, and supply and sale of gas, &c.; conversion, &c., of residual products; acquisition of lands and easements by agreement; district of supply; power to lay mains and pipes, and to open roads, &c.; to acquire patent rights, &c.; to enter into contracts with local and other authorities, bodies, and persons; to levy gas rates, rents, and charges, and to sell or lease lands; regulation of price of gas and dividends; incorporation and amendment of Acts; and other purposes.

Castleford Local Board.—Compulsory purchase of lands; construction of gas-works; manufacture and supply of gas; purchase by agreement or compulsion of undertaking of the Castleford and Whitwood Gaslight and Coke Company, Limited; power to local board and the company to make agreements; winding up and dissolution of company; power to local board to carry on undertaking, to make and supply gas, to break up streets; power to local board to transfer to sanitary and other authorities parts of undertaking, and to carry on same, &c.; altering dividends and other matters; imposition of penalties; regulations relating to the supply of gas; power to levy and alter rates and charges, to borrow money; incorporation of Acts; and other purposes.

Cheltenham Corporation Water.—Purchase by compulsion or agreement and transfer of the undertaking of the Cheltenham Water-Works Company to the Corporation of Cheltenham; winding up and dissolution of company; power for corporation to carry on undertaking; construction of reservoirs, road diversions, and other works; compulsory purchase of lands; diversion of streams and appropriation of water; powers to raise money; to levy rates; to grant annuities; to break up roads; provisions as to supply of water, in bulk or otherwise, to Corporation of Tewkesbury and other urban sanitary authorities, rural sanitary authorities, or local authorities; amendment of Acts; and other purposes.

Cheltenham Water.—Additional works; extension of limits; supply of water from River Severn (but without increasing quantity authorized to be taken by Cheltenham Water-Works Act, 1865) within the company's existing and extending limits; purchase of lands; rates, rents, and charges; application of funds; further money powers; amendment of Acts; further provision for protection, &c., of works, and as to internal affairs of the company; incorporation of certain provisions of Railways Clauses Consolidation Act, 1845.

Cleveland Gas.—Extension of limits and others powers; amendment of Act.

Clitheroe Gas, Water, and Improvement.—Purchase of undertakings of gas and water companies and power to corporation to carry on the same; confirmation of agreements, and dissolution of those companies; construction of reservoir and other works; diversion of footpath; meters, pipes, and fittings; provisions as to supply of gas and water to local authorities and others; street improvements; compulsory purchase of lands, &c.; bye-laws, regulations, penalties; money powers; incorporation, repeal, and amendment of Acts.

Cockermouth and Workington Water.—Power to local boards of Cockermouth and Workington, and rural sanitary authority for Cockermouth Union, to construct water-works, and take water from the Crummock Lake for the supply of water to their respective districts and neighbouring places; lowering bed of lake and River Cocker; purchase of lands compulsorily and by agreement; levying of tolls, rates, rents, and charges; borrowing of moneys; bye-laws and regulations; mutual agreements; incorporation of joint committee; powers to Maryport to combine in scheme; amendment of Acts.

Dalton-in-Furness District Local Board of Health.—Repeal and amendment of part of the sixth section of the Barrow-in-Furness Corporation Act, 1868; gas-works and powers as to the manufacture and storeage of gas and residual products; purchase, leasing, and disposal of lands; provisions with respect to streets, houses, buildings, sewers, and drains; borrowing powers; power to the Public Works Loan Commissioners to lend money to board; purchase of Dalton Gas-Works; purchase of part of Barrow Corporation gas plant and rights.

Dartmoor and Exeter Water.—Dissolution of the Dartmoor and Exeter Water Supply Company, Limited; incorporation of new company; powers to supply water in the city and county of the city of Exeter, and certain parishes and places in the county of Devon; construction of works; compulsory purchase of lands and water rights; diversion of waters; purchase of undertaking of, agreements with, and dissolution of Exeter Water Company; power to enter into agreements with Corporation of Exeter, local and other authorities; provisions with reference to the vesting of the undertaking in the Corporation of Exeter, and powers to the corporation with reference thereto, and to the supply of water, the levying of rates, the application of funds, granting annuities, and borrowing further moneys; other powers; amendment or repeal of Acts.

Deal Water.—Repeal or amendment of Deal Water Act, 3 & 4 Vict., cap. 113; powers for taking, storing, and distributing water; breaking up roads; supplying meters, acquiring patent rights, &c.; rates; special provisions as to supply and recovery of rates in certain cases, and for giving effect to sec. 62 of Public Health Act, 1875; regulations for preventing misuse, &c., of water; further money powers; capitalization of moneys expended out of income on works, &c.; provisions affecting the internal administration of the company.

Doncaster Corporation Water.—Powers to borrow further moneys; to extend the term for compulsory purchase of lands, and for construction of works; amendment and incorporation of Acts; and other purposes.

Dore Water.—Incorporation of company; powers to supply water within the parishes, townships, and places of Dore Totley and Dronfield, in the county of Derby, and Upper Hallam and Ecclesall Bierlow and Sheffield, in the West Riding of the county of York; construction of works; diversion of water; agreements with local and other authorities, bodies, and persons; provisions authorizing and requiring the company of proprietors of the Sheffield Water-Works to supply water to the company, and to perform other duties and obligations with reference to such supply and otherwise, and imposing penalties for the non-observance or breach thereof; agreements with and powers to that company; other powers; amendment or repeal of Acts.

Drumcondra, Clonliffe, and Glasnevin Township.—Constitution of new township, and powers to commissioners; contracts for supply of gas and water; incorporation of general Acts; and other purposes.

Dublin Corporation Water-Works Acts Amendment.—Powers to the Corporation of Dublin to acquire by compulsory purchase or otherwise a piece of land at Stillorgan for the purpose of constructing an additional reservoir or additional reservoirs for water thereon; repeal or amendment of Acts; and other purposes.

Durham Water.—Dissolution and re-incorporation of the Durham Water Company, with powers to maintain and extend existing water-works; to make and maintain new works, and to take water from the River Wear for the supply of the borough and city of Durham and neighbouring places; compulsory purchase of lands; sale of lands; protection of water and works of company; rates, rents, and charges; incorporation of Acts.

East Grinstead Gas and Water.—Incorporation of company; purchase of works, &c., of East Grinstead Gaslight and Coke Company; construction and maintenance of gas and water works; supply of gas and water in parish of East Grinstead; purchase, &c., of lands; gas and water rates; patent rights; gas and water meters, &c.; agreements with sanitary authorities, &c.

East Retford Borough.—Extension of borough, &c.; purchase by corporation of undertakings of Retford Gas and Coke Company, Limited, and of Retford Cattle Market Company, Limited, and winding up of those companies; powers for corporation to levy rates, borrow money, appoint committees, and appoint a deputy town-clerk; repeal, amendment, and incorporation of Acts.

Exeter Corporation Water.—Purchase by corporation of the respective undertakings of the Exeter Water Company and the Dartmoor and Exeter Water Supply Company, Limited; winding up and dissolution of respective companies; powers for corporation to carry on undertakings and supply water and levy rates in companies districts, and to raise and borrow money on mortgage and otherwise; amendment of Acts.

Exeter Gas.—New works; compulsory purchase of lands; additioanl capital; amendment of Acts.

Farnworth and Kearsley Gas.—Additional share and loan capital; purchase of lands and construction of new works; manufacture and storeage of gas and residual products; amendment of sec. 16 of Farnworth and Kearsley Gas Act, 1854; other powers; amendment or repeal of Acts.

Forfar Water.—Construction of works; power to take, compulsorily and otherwise, lands, waters, and other property, including waters of White Burn, Den of Ogil Stream, and watercourse or tail-race from the water-wheel of the threshing-mill of the farm called Goynd; power to supply water; power to borrow money; rates and assessments; repeal or amendment of Acts; other purposes.

Grand Junction Water.—Extension of limits of supply; further money powers; provisions with respect to directors, meetings, auditors, appointment, &c., of officers, &c., and other provisions affecting the internal affairs of the company; amendment of Acts.

Hamilton Burgh.—Extension of boundaries, &c.; powers with respect to existing water-works and gas-works, and extension and regulation of water and gas supply; powers to take lands, and to levy and recover assessments, rates, and rents; alteration of rights; incorporation and amendment of Acts.

Hartlepool Gas and Water.—Alteration, amendment, or repeal and consolidation of all or some of the provisions of the Hartlepool Gas and Water Act, 1867, and the Hartlepool Gas and Water Act, 1867, Amendment Act, 1874; dissolution and re-incorporation of company; additional

borrowing powers in respect of the company's present authorized capital; additional capital, and borrowing powers in connection therewith; purchase of lands by agreement; provisions as to supply of light otherwise than by means of gas; provisions as to use of patent rights, and for stopping up footpath; incorporation of Acts; and other purposes.

HEMEL HEMPSTED DISTRICT GAS.—Dissolution of Hemel Hempsted and Boxmoor Gas and Coke Company, Limited, and Boxmoor Two Waters and Crouchfield Gas and Coke Company, Limited; incorporation into a company of the proprietors of the dissolved companies and other persons; money powers; defining limits of supply; power to new company to hold and purchase lands and manufacture and supply gas, &c.; power to acquire undertakings of King's Langley Gas Company, Limited, and Hunton Bridge and Abbots Langley Gas Company, Limited; agreements with local authorities and persons; and other purposes.

HENLEY-UPON-THAMES WATER.—Incorporation of company; construction of works, and supply of water to Henley-upon-Thames; compulsory purchase of lands; power to agree with the Local Board of Henley-upon-Thames, or with any other corporate bodies or sanitary authorities; and to levy rates, rents, and charges.

IMPERIAL CONTINENTAL GAS ASSOCIATION.—Powers as to capital, &c.; amendment of existing Act.

LEA BRIDGE DISTRICT GAS.—Dissolution and re-incorporation of the Lea Bridge District Gaslight and Coke Company, Limited; power to continue gas-works; to supply gas in Walthamstow and Leyton, in Essex; to acquire and hold lands and break up streets; to raise further capital; to levy rates, rents, and charges; to confirm agreement with the West Ham Gas Company; and other powers.

LEICESTER CORPORATION.—Purchase of undertakings of the Leicester Gas Company, and of the Leicester Water-Works Company; powers to agree; confirmation of agreements; winding up and dissolution of the said companies; parks and recreation grounds; levying of rates; borrowing of money; bye-laws and regulations; amendment, repeal, and consolidation of Acts.

LEWES GAS.—Dissolution and re-incorporation of the Lewes Gaslight Company; power to continue gas-works; to supply gas in Lewes and adjoining parishes; to raise further capital; to levy rates, rents, and charges; and other powers.

LICHFIELD GAS.—Dissolution and re-incorporation of Lichfield Gaslight Company; maintenance of existing works and new works; manufacture and storeage of gas, or other means of producing artificial light, and conversion, &c., of residual products; power to supply city of Lichfield, and adjoining and neighbouring parishes and places; purchase of lands, by agreement or otherwise; powers to hold, &c., patent rights; to deal in gas, coal, &c.; to manufacture, purchase, hire, &c., meters, fittings, and apparatus; to enter into agreements with sanitary and other authorities, bodies, and persons, and other powers; rates, rents, and charges; sale or lease of lands.

LIMERICK CORPORATION.—Confirmation of agreements for purchase of Limerick Gas Company's undertaking; powers to levy rates; borrowing powers; power to maintain and continue gas-works; limits of supply; amendment of Acts; and other powers.

MANCHESTER CORPORATION WATER.—New works for the supply of water from Lake Thirlmere; special provisions as to lands; power to raise further money on rates; amendment of Acts.

MANSFIELD COMMISSIONERS GAS UNDERTAKING.—Transfer of the undertaking of the Mansfield Gaslight Company to the Mansfield Improvement Commissioners; purchase of land by agreement; power to lay mains and supply gas within the parishes of Mansfield, Mansfield Woodhouse, and Warsop; to charge and levy gas rents or rates; to borrow money; confirmation of agreement; dissolution of company; amendment of Acts; and other purposes.

MARSKE AND SALTBURN GAS.—Incorporation of company; powers to company to supply gas within the parish of Marske, in Cleveland; to purchase the present gas-works at or near Marske, and to maintain and enlarge or discontinue same; to confirm agreements for purchase of same; to manufacture and store gas and residual products, &c.; to purchase land, &c., and to sell land, &c., not required for purposes of company; powers to lay mains and pipes; to open roads, &c.; to acquire and use patent rights; to manufacture, purchase, hire, &c., gas-fittings, meters, &c.; to levy rates, rents, and charges; to confer, vary, and extinguish rights, privileges, and exemptions; contract with the Saltburn Improvement Company, local authorities, and others, for lighting, &c.; for entering into arrangements with, or selling and transferring of undertaking of company to, or amalgamating or entering into working or other arrangements with, the Redcar and Coatham Gas Company, and dissolution of company, &c.; incorporation and alteration of Acts, &c.; and other purposes.

MARYPORT IMPROVEMENT.—Amendment of local Acts; alteration and equalization of the price of gas; incorporation of Acts; and other purposes.

METROPOLIS WATER SUPPLY.—Power to Metropolitan Board of Works to construct works for the supply of water to the Metropolis; special powers as to the laying of pipes, and obligations upon consumers; compulsory purchase of, and interference with, lands and other property; levying of rates; borrowing and raising of money; application of moneys by board to purposes of proposed Act; amendment of Acts; and other powers.

METROPOLIS WATER-WORKS PURCHASE.—Compulsory sale to Metropolitan Board of Works, and vesting in them of the undertakings of the Metropolitan Water-Works Companies; power to Metropolitan Board of Works to supply water to the Metropolis, and to districts beyond the Metropolis now included within the limits of supply of companies whose undertakings are acquired; dissolution of companies; amendment of their Acts; creation of stock; borrowing, rating, and other powers.

MID-CHESHIRE WATER.—Incorporation of company; powers to supply water within the parishes of Delamere, Willington, Tarvin, Little Budworth, Tarporley, Whitegate, Over, Weaverham, Davenham, Great Budworth, Middlewich, Warmingham, Sandbach, Knutsford, and Rostherne, in Cheshire; and to purchase and maintain, &c., the well of Guardians of Poor of Northwich Union, and make other water-works; purchase of lands; rates; protection of company's works, water, &c.; purchase of other water-works, &c., by agreement; agreements with sanitary authorities, &c.

NEWBURY BOROUGH EXTENSION.—Extension of borough, &c.; acquisition by corporation of the undertaking of the Borough of Newbury Gaslight and Coke Company; maintenance of existing gas-works, and manufacture and sale of gas and residual products throughout the existing and extended district; acquisition of gas-mains and pipes belonging to the Speenhamland Improvement Commissioners; extension of borrowing powers; payment of costs of Act; incorporation of Acts; amendment of Acts; and other purposes.

NEWRY GAS.—Purchase by the Town Commissioners of Newry of the undertaking of the Newry Gas Consumers Company, Limited; winding up and dissolution of that company; power to borrow money and levy rates; amendment of Act.

NORMANTON GAS.—Dissolution and re-incorporation for gas purposes of the Normanton Gas and Water Company; powers for manufacturing gas and residual products; and supplying gas within the townships comprised in or adjoining to the parish of Normanton; other powers usually conferred on gas companies; increase of capital.

NORWOOD (MIDDLESEX) DISTRICT WATER.—Incorporation of company; construction of works; supply of water to Norwood Green, Southall, Heston, Hounslow, and other places in the county of Middlesex; rates and charges.

NOTTINGHAM IMPROVEMENT, GAS, AND WATER.—Construction of new gas-works by Corporation of Nottingham; purchase of undertaking of Nottingham Water-Works Company, and winding up of that company; construction of new road by corporation, &c.; powers for corporation to establish superannuation-fund, make bye-laws, and borrow money; amendment, repeal, and incorporation of Acts.

NOTTINGHAM WATER.—Extension of limits for supply of water; increase of capital; reduction of the number of directors; amendment of Acts.

RADCLIFFE AND PILKINGTON GAS.—Acquisition of lands for new works; additional capital; amendment of Acts.

SCARBOROUGH CORPORATION WATER.—Defining district of supply; purchase by compulsion or agreement and transfer of water undertakings of the Scarborough Water-Works Company and the Filey Water-Works Company to the Corporation of Scarborough; confirmation of agreements with respect to purchase of same; dissolution and winding up of the Scarborough Company; power to the corporation to carry on the undertakings; to break up streets, &c., and to lay pipes, &c.; to supply water; to manufacture, provide, or let meters, fittings, &c., and other incidental provisions; power to levy rates; to supply water by measure or in bulk; provisions for preventing waste, misuse, &c., of water, and as to service-pipes and consumer's fittings; powers to raise and apply moneys; agreements with local authorities, bodies, and persons for supply of water; purchase by compulsion or agreement of undertakings of the Scalby Water Company, Limited, and the Cloughton Water Company, Limited, and others; agreements with respect to purchase of same; dissolution and winding up of those companies; to confer, vary, extinguish, &c., rights, powers, privileges, and exemptions; incorporation, alteration, repeal, &c., of Acts; and other purposes.

SCARBOROUGH WATER.—New works; extension of limits of supply; purchase of Scalby Water-Works; abstraction of water from Fylingdales and Fylingdales Moor; additional capital and other powers; repeal or amendment of Acts.

SEVENOAKS WATER.—Dissolution of the Sevenoaks Water-Works Company, Limited; incorporation of new company; vesting in them of undertaking, &c., of limited company; power to supply water in Sevenoaks and Seal parishes; purchase of lands, &c., by agreement; rates; confirmation of agreement between limited company and South-Eastern Railway Company; sale or transfer of undertaking, &c., to and agreements with Sevenoaks Local Board; protection of company; works, &c.

SHREWSBURY GAS.—Extension of limits of supply; power to manufacture gas and residual products, and to store gas on additional land; additional lands; additional capital; consolidation of capital; amendment of Act.

SOUTH HANTS WATER.—Extension of limits, so as to include parishes of North Baddesley, Chilworth, Hound, St. Mary Extra, Bursledon, Hamble, Botley, Otterbourne, and Bishopstoke, Hants; further money powers; amendment of Act.

SOUTH LONDON (SPRING) WATER.—Incorporation of company for supply of water from springs at Tooting; construction of works; supply of water to Wimbledon, Richmond, Croydon, Kingston, Lewisham, Streatham, Tooting, Camberwell, Lambeth, and neighbourhood; arrangements for sale or lease of undertaking to, or amalgamation with, other companies supplying districts; agreements for sale of water to other companies, bodies, and persons; agreements with Metropolitan Board of Works or Local Boards of Wimbledon, Croydon, Richmond, &c., as to water supply or sale of undertaking; power to acquire deep springs and wells belonging to Henry William Martin, Esq., and others; powers over Streatham Common; compulsory purchase of lands; power to levy rates, &c.; amendment or repeal of Acts.

SOUTHPORT WATER.—Construction or confirmation of the construction of additional works; purchase or acquisition of lands; extension of limits of supply and of power to levy rates; increase of capital; confirmation of deeds; amendment of Acts; and other purposes.

SOUTH STAFFORDSHIRE WATER.—New works, alterations, and extensions; supply of water to Rugeley; powers as to Burton-upon-Trent Commissioners; increase of capital, borrowing and other powers; amendment of Acts.

STOKE-UPON-TRENT CORPORATION GAS.—Acquisition by the mayor, aldermen, and burgesses of Stoke-upon-Trent, and the Local Board of Fenton, or one of them, of the undertaking of the Stoke, Fenton, and Longton Gas Company; confirmation of agreement; power to the said mayor, aldermen, and burgesses and the said local board, or one of them, to supply gas; additional lands; borrowing money; dissolution of gas company; amendment or repeal of Acts; and other purposes.

STONE WATER.—Incorporation of company; construction of works; supply of water to Stone and other places in the county of Stafford; rates and charges.

SUTTON-IN-ASHFIELD GAS.—Purchase by the Sutton-in-Ashfield Local Board of the undertaking of the Sutton-in-Ashfield Gaslight and Coke Company, and winding up of that company; powers for the local board to supply gas in company's district; to levy rates and borrow money, and to make agreements for supply of gas with sanitary authorities; amendment and incorporation of Acts.

TORQUAY GAS.—Additional share and loan capital; purchase of lands; power to hold patent rights; other powers; amendment or repea of Acts.

TREDEGAR WATER AND GAS.—Power to the Tredegar Iron and Coal Company, Limited, to supply water and gas within parts of the parishes of Bedwellty, in the county of Monmouth, or Llangunnyder or Llangynnider, in the county of Brecon; maintenance of existing and construction of new works; manufacture and storeage of gas and residual products; impounding of waters; purchase of lands and water rights, &c., by compulsion and agreement; power to hold patent rights and licences; manufacture and deal in meters, fittings, and apparatus; levy rates and charges; capital powers; conferring same powers on a company to be incorporated; and other purposes.

TROWBRIDGE WATER.—Extension of limits to include the parishes of Westbury, Bradford-on-Avon, Melksham, Whaddon, Westwood, and Winkfield; additional works; power to take water from Semington Brook, Paxcroft Brook, the Biss Springs, and the River Biss; purchase of lands; further money powers; extension of time for completion of authorized works; change of name of company; repeal or amendment of Acts.

TRURO WATER.—Extension of time for completion of works; repeal, incorporation, and amendment of Acts; and other purposes.

WARRINGTON WATER.—Extension of limits of supply of the Warrington Water-Works Company; power to levy rates; application within extended limits of powers of the company's existing Acts; new works; purchase of lands and easements compulsorily and by agreement;

increase of capital; amendment, repeal, and incorporation of Acts; and other purposes.

WATERFORD CORPORATION WATER AND IMPROVEMENT.—Amendment of the Waterford Water Act, 1871, and other Acts, &c.; alteration of rates, charges, &c.; additional rating and borrowing powers.

WEST HOUGHTON LOCAL BOARD.—Construction of water-works and supply of water; compulsory purchase of lands; contracts with sanitary authorities; purchase of undertaking of the West Houghton Consumers Gas Company; levy of rates; borrowing of money; repeal and amendment of Acts; and other purposes.

WESTON-SUPER-MARE IMPROVEMENT COMMISSIONERS WATER.—Purchase of undertaking of Weston-super-Mare Water-Works Company; dissolution of that company; powers to commissioners to supply water within their district, and the parishes of Uphill, Kewstoke, and Worle, in the county of Somerset; agreements with public and local bodies; powers to purchase additional lands and to dispose of superfluous lands; further powers as to rates; application of funds; new and additional borrowing powers; other powers; amendment or repeal of Acts.

WHITEHAVEN UNION WATER.—Power to construct water-works and impound water; supply of water; purchase of lands; levying of rates; borrowing of money; repeal; incorporation, and amendment of Acts; and other purposes.

YORK UNITED GAS.—Extending company's district of supply and the powers of company to extended district; to levy new and vary existing rates, rents, and charges; to fix price of gas; purchase of lands, houses, and easements by compulsion or agreement, and extinction of rights over same, and disposal of superfluous property; new and enlargement of existing gas-works; power to break up roads, &c., and lay down pipes, &c.; further provisions with respect to sale, supply, and price of gas; for recovery of rates, &c., with respect to waste, &c., of gas and injury to pipes, &c., and fouling of water; provisions as to quality, pressure, and illuminating power of gas; powers to acquire patents, &c., and to manufacture, hire, sell, &c., meters and fittings; agreements with local authorities and others as to supply, &c., of gas; further capital; amendment or repeal and incorporation of Acts; and other purposes.

NOTICES OF APPLICATIONS TO THE BOARD OF TRADE (SESSION 1878) UNDER THE GAS AND WATER-WORKS FACILITIES ACT, 1870.

ALCESTER WATER.—Power to construct, maintain, and continue water-works and works connected therewith in, and supply water to, the parishes of Alcester and Arrow, and hamlet of Oversley, all in the county of Warwick; to levy rates; and other purposes.

BILLINGE GAS.—Powers to construct and maintain gas-works within the township of Billinge-Chapel-End, in the parish of Wigan, in the county of Lancaster, and to supply gas within the said township, and in the adjoining township of Billinge-Higher-End and Winstanley, both in the parish of Wigan and the hamlet of Moss Bank, in the township of Windle, in the parish of Prescot, all in the county of Lancaster; to lay mains and pipes; break up streets; levy rates and charges; incorporation of Acts; and other purposes.

BOGNOR GAS.—Power to raise additional capital.

CUCKFIELD, HAYWARD'S HEATH, AND LINDFIELD WATER.—Construction of works and supply of water to Cuckfield and other places, all in the county of Sussex; power to levy rates, &c.

DYSYNNI GAS.—Powers to maintain, continue, and enlarge gas-works; to manufacture and supply gas and residual products; limits of supply; power to levy rates and charges; to break up streets and roads; to acquire additional lands; to incorporate Acts; and other purposes.

ELLAND GAS.—Power to raise additional capital; to acquire additional lands; to construct, maintain, continue, and enlarge gas-works; to supply gas; to incorporate Acts; and other purposes.

FORMBY GAS.—To enable the Formby Gas Company, Limited, to purchase or lease lands, and erect and maintain gas-works thereon, and to supply gas within the townships of Formby and Altcar, and places adjacent thereto, to manufacture and store gas and residual products, to lay down mains and pipes, and break up streets, &c., to levy rates, rents, and charges for supply of gas, to make contracts, &c.; power to sell undertaking and works to local authority; incorporation of Acts; and other purposes.

FOWEY WATER.—Powers to construct water-works, and to supply water to Fowey, in the county of Cornwall.

FRITH HILL, GODALMING, AND FARNCOMBE WATER.—Powers to construct water-works, and to supply water within the parish of Godalming, in the county of Surrey.

GODALMING GAS.—Maintenance of existing gas-works; manufacture and storeage of gas and residual products; limits of supply; levy of rates and charges; opening of streets; increase of capital; and additional lands.

GREENHITHE GAS.—Powers to supply with gas the parishes of Stone and Swanscombe, in the county of Kent, and to maintain and enlarge their existing gas-works; to acquire land, &c., by agreement; to manufacture, store, convert, &c., gas and residual products, &c.; to acquire and use patent rights and licences; to fix and regulate the capital of the company for the purposes of the Provisional Order, and price, quality, and pressure of gas; to manufacture or purchase, and to sell or hire gas-meters, fittings, &c.; to levy rates, rents, and charges for gas and meters, &c.; to lay down pipes, &c.; to break up streets, &c.; contracts with local authorities and others; for amalgamating the undertaking with that of the Dartford Gas Company, and as to agreements with that company for joint supply of their respective districts; incorporation of Acts; and other purposes.

HOLYWELL WATER.—Powers to purchase lands; construction and maintenance of water-works; supply of water to Holywell Town, Brynford, Greenfield Whelstone, Bagillt-fawr, Bagillt-fechan, and neighbourhood; power to levy rents and rates, to break up roads and streets, to lay down mains, to make bye-laws and impose penalties, to abstract water from St. Winifred's Well and other sources, to purchase water-works, and to sell undertaking; incorporation of general Acts; and other purposes.

HOYLAKE AND WEST KIRBY GAS AND WATER.—Powers to construct and maintain gas and water works within the parishes of West Kirby and Bidston, in the county of Chester, including the townships of Great Meolse, Hoose, and Little Meolse, otherwise Holylake, and of Saughall Massie, West Kirby, and Grange, all in the county of Chester; to lay mains and pipes; break up streets; levy rates and charges; incorporation of Acts; and other purposes.

NEWQUAY GAS AND WATER.—Powers to construct gas-works and water-works, and to manufacture and supply gas and to supply water to Newquay, in the county of Cornwall.

NEW TREDEGAR GAS AND WATER.—Maintenance of existing gas and water works; manufacture and storeage of gas and residual products; supply of gas and water within prescribed limits; levying of rates and charges; opening of streets; increase of capital; incorporation of Acts.

NORTHERN LONDON ESTATES.—Powers to construct water-works, and to supply water to a certain estate belonging to the Northern London Estates Company, Limited, known as the Bush Hill Park Estate, situate in the parishes of Enfield and Edmonton, in the county of Middlesex, and also to certain lands adjoining the said estate, and not belonging to the said company.

NORWOOD (MIDDLESEX) DISTRICT WATER.—Authority to construct water-works, and to supply water to Norwood Green, Southall, and other places in the precinct or parish of Norwood, in the county of Middlesex.

OYSTERMOUTH WATER.—Powers to construct water-works and supply water within the urban sanitary district of Oystermouth; purchase of lands and easements; levying rates; incorporation of Acts.

SANDOWN GAS.—Powers for extension of limits of supply; purchase of lands; enlargement of works; laying mains and pipes, and breaking up streets and roads; levying rates and charges; additional capital; regulations with respect to price and dividends; incorporation of Acts; and other purposes.

SHANKLIN GAS.—Powers for extension of limits of supply; purchase of lands; enlargement of works; laying mains and pipes, and breaking up streets and roads; levying rates and charges; additional capital; regulations with respect to price and dividends; incorporation of Acts; and other purposes.

SHIREHAMPTON DISTRICT GAS.—Powers to construct, continue, maintain, and enlarge gas-works, and to supply gas and residual products to the district of Shirehampton, and other places in the county of Gloucester.

STRATFORD-UPON-AVON GAS.—Power to raise additional capital; incorporation and amendment of Acts; and other purposes.

WALTON-ON-THE-NAZE GAS AND WATER.—Power to maintain and continue gas and water works, and to manufacture and supply gas, and to supply water; to construct additional works for water supply; to raise additional capital; agreements with and sale to public bodies and others; levy rates, &c.

WESTON-SUPER-MARE GAS.—Powers to raise additional share and loan capital; amendment of Acts.

WOKINGHAM WATER.—Authority to construct water-works, and to supply water to Wokingham and other places in the county of Berks.

NOTICES OF APPLICATIONS TO THE LOCAL GOVERNMENT BOARD (SESSION 1878) UNDER THE PUBLIC HEALTH ACT, 1875.

DROITWICH CORPORATION GAS.—Powers to purchase the undertaking of the Droitwich Gaslight Company, Limited; to raise money; to confirm agreement; to manufacture and supply gas within the borough of Droitwich, and to levy rates and charges; incorporation of Acts; and other purposes.

ILKESTON LOCAL BOARD.—Powers to purchase and maintain the undertaking of the Ilkeston Gaslight and Coke Company; to authorize and confirm agreements; to manufacture and supply gas; to define limits and break up streets; to borrow money; to levy rates and charges; incorporation of Acts; and other purposes.

SAFFRON WALDEN BOROUGH GAS.—Authority to maintain and continue gas-works within the borough, and any works connected therewith; and to manufacture and supply gas, and to construct and maintain all necessary works for that purpose.

TOW LAW LOCAL BOARD.—Authorizing a gas undertaking, and for powers to purchase the existing gas-works, and to manufacture and supply gas throughout the whole or any part of the district of the Tow Law Local Board, and for power to borrow money.

Legal Intelligence.

BATH COUNTY COURT.—THURSDAY, NOV. 22.

(*Before Mr.* CALLAIRD, *Judge.*)

BAILEY *v.* ANDERSON.

The plaintiff, Wm. Bailey, is a labourer, and defendant is the manager of the Bath Gas-Works. The action was to recover part of a week's wages. Mr. PETGRAVE appeared for the gas company.

Plaintiff deposed that he was engaged as a labourer at the gas-works. He was a "coke doughter." On a certain day Mr. Anderson came to him and told him to leave that work and "go stoking." He was physically unable to do this, and did not know the way. He consequently refused, and was discharged by defendant.

In reply to Mr. PETGRAVE, plaintiff said he had done stoking before, but, having been in the works only four months, he did not understand the work. He had done it with "four hands," but on this occasion there were only "three hands."

His HONOUR said he did not understand these technicalities. What did plaintiff mean by "three hands?"

Plaintiff explained that there were three men at the retort shovel.

In reply to further questions from Mr. PETGRAVE, plaintiff admitted that the rules of the works were that a man should do what he was asked.

His HONOUR said that in that case plaintiff could not, on his own evidence, recover, and he entered a nonsuit, with costs of two witnesses.

SHEFFIELD POLICE COURT.—TUESDAY, NOV. 20.

(*Before the* STIPENDIARY MAGISTRATE.)

DISMISSAL OF A STOKER FOR DISOBEYING ORDERS.

The *Sheffield United Gas Company* were summoned by William Riley, a stoker, who claimed from them the sum of 70s. for wrongfully dismissing him without notice.

It appeared that some time ago the plaintiff was engaged by the Sheffield United Gaslight Company, and worked at their Neepsend works until Tuesday, Oct. 30. The engagement was subject to a fortnight's notice. He worked seven shifts per week, at 5s. per shift, thus making 35s. a week. The amount claimed for the fortnight was therefore £3 10s. On the day in question, Mr. Romans, the engineer, came round and found some fault with the appearance of the retorts, and finally ordered the plaintiff to draw his fire out. The fire having attained a great heat, this would have been, in plaintiff's opinion, a difficult and dangerous operation, and he declined to do it. On this account he was discharged there and then. The plaintiff usually took orders from his foreman, who did not countermand the order given by Mr. Romans. The order did not appear, from the evidence of the foreman, to be an unusual one, nor was the operation one attended with danger.

Mr. BARKER, who appeared for the company, submitted that the engineer having given an order within the scope of his authority, which the plaintiff had refused to obey, there was sufficient justification for dismissal.

The MAGISTRATE said he thought that the plaintiff, far from having any claim against the company, had acted in a very foolish manner in not obeying the orders of his superior, and in flinging away a situation that was worth 35s. a week. The case was accordingly dismissed.

Mr. BARKER said the company had acted in perfect good faith towards the plaintiff. They had not taken the preliminary objection that was open to them, nor would they now ask for costs.

BRISTOL POLICE COURT.—Wednesday, Nov. 28.
(*Before Messrs.* Hare, Mills, *and* Whitwell.)

CONVICTION FOR STEALING WATER.

Frank Rolls was summoned for that he, being a person not supplied with water by the Bristol Water-Works Company, unlawfully did, on the 1st of November, from a certain tap in a void house in Bouverie Street, take and use water supplied by the water company.

The defendant pleaded guilty.

Mr. Fussell, who appeared for the company, said on the 1st of November a sub-inspector of the company was watching some houses that had been built in Bouverie Street, when he saw the defendant with a long hose conveying the company's water from the house to some buildings in the course of erection in an adjoining street, and using it for building purposes. The case was brought under the 20th section of the Water-Works Clauses Act, 1863, the full penalty being £5 for the first offence.

The *defendant* said he was working for Mr. Foley, and took the water from the tap as it was nearer than the pump.

The Bench inflicted a penalty of 20s. with costs, or one month's imprisonment with hard labour.

SOUTHWARK POLICE COURT.—Friday, Nov. 30.
(*Before Mr.* Partridge.)

SUMMONS AGAINST A WATER COMPANY FOR REFUSING TO SUPPLY WATER.

The Southwark and Vauxhall Water Company were summoned by Charlotte Snook, of St. James's Road, for refusing to supply her with water after tendering the rates due.

Complainant said she had been a customer of the water company for 20 years, and had been upwards of four years in her present abode. She unfortunately allowed the water-rate to be in arrears for the sum of 28s., and because she was not able to pay that sum when last demanded, they cut the water off. She begged of the collector to call again before doing so; but he took no heed of her appeal, and she had since been without water.

Mr. Partridge asked her if she had paid the excess due.

Complainant replied that she had tendered the money, but the company refused to put the water on again unless she paid all expenses for cutting off and replacing the pipe, as well as a quarter in advance. She could not do that, and the consequence was that the drains were stopped and health endangered.

Mr. Partridge thought the company did wrong in cutting off the water, when they held the power to summon complainant to this Court for the arrears.

Complainant said that small-pox and fever were on each side of her, and it was necessary that she should have a good supply of water. If the company had only waited two hours before they cut it off she would have been able to pay them.

Mr. Partridge said, although the company were, by their Act, entitled to do as they had done, he thought they had been a little too harsh by cutting off the water where small-pox and fever were raging. The complainant seemed to be a poor and respectable female, who had paid the rates to them for so many years, that he thought the company might restore her the supply of water on her payment of the arrears due.

An officer of the company who was in attendance promised to lay his worship's recommendation before the directors.

Mr. Partridge, in dismissing the summons, directed the cost of it to be returned to complainant.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

Vestry of Mile End Old Town.

At the Meeting of this Vestry on the 28th ult.—Mr. Wood in the chair,

Mr. Prevost said he, in common, he supposed, with other vestrymen, had just received from the Metropolitan Board a report of a scheme for a new water supply to London. Although the report was dated August, he had only just received it, and he confessed his great surprise to find that the Metropolitan Board had hastily decided the matter without giving their constituents (the vestries) any opportunity of offering an opinion on the scheme. He asked Mr. Jones, the member of the Metropolitan Board representing the vestry, whether he could give any information on this matter.

Mr. Jones said the vestry were aware that the question of the supply of water to London had been agitated in and out of the Metropolitan Board for a long time past, and if vestrymen had not long ago received a copy of the scheme, he could only express his surprise. The scheme was published in August last, and a section of the Metropolitan Board was very anxious to press the question before Parliament for its consideration, and the matter had been matured by that section too much in committee with closed doors. The uninitiated members of the Metropolitan Board, who, as it was proved, were in a minority, were thus to a large extent in the dark, and they were only recently enlightened. When, a fortnight ago, a special meeting of the Board was called at a short notice to approve the scheme, it was carried, himself and Mr. Munro voting against it with a considerable minority. An effort was made to induce the Board to reconsider the position at the last meeting, but the opposition was again defeated by a narrow majority. The fact was that the whole matter arose out of the report of the House of Commons Committee on the management of the Fire Brigade. That committee, among other things, declared the present water supply of London insufficient for the rapid extinction of fires, and they said that this might be obviated by the amalgamation of the water companies under one control, as one step; and the general use of hydrants was enjoined. He (Mr. Jones) voted for the absorption of the water companies under the control of the Metropolitan Board, but against the other scheme, which proposed to expend 5½ millions of money, the estimates being even then based upon the sanguine supposition that no difficulties would arise. Upon this point, speaking as an engineer, he had not the slightest doubt that the sum named would be quite inadequate for the purpose. His own opinion was that if the water companies service were concentrated into the hands of the Metropolitan Board, with two such sources of supply as the Thames and the Lea, with subsidiary sources in the chalk in Kent, Surrey, and the Northern Hills, there would be ample means of supply to the Metropolis. The engineer's plan, of course, expressed a different opinion, but he ventured to express his own as a professional engineer. Dr. Frankland, the Government inspector, reported the water supply of London to be good, and certain waters he declared to be "excellent," equal "to the best deep well water." It was quite true that all the companies supply was not thus praised; but what the East London Company could do, the other companies could do under concentrated management. The other desideratum to be provided by the new scheme of the Metropolitan Board was to secure a pressure sufficiently high to allow of the universal use of hydrants so as to throw a stream of water to the top of the highest houses straight from the main. Now the New River Company were doing this at the present time, and hydrants were in use in the City in consequence. Speaking as an engineer, he felt quite satisfied that, if the various undertakings were amalgamated, a head of water could be obtained sufficient for the purpose. One company had arranged to make their head-level equal to 400 feet, which was just the level proposed in the new scheme. He contended that what one company could do every company could do by mechanical appliances. He, therefore, voted against the proposition to go all round London, from 15 to 25 miles, to raise water into reservoirs. The Board also proposed to put cisterns into houses having already a water supply, and to give from two to ten gallons each per day into those cisterns, reserving all the rest for fire purposes. He could not help thinking that was a very wild scheme, and that existing sources could be made ample to supply the whole of London without any very great expense.

Mr. Knight entirely coincided with Mr. Jones, and condemned the whole scheme of the Metropolitan Board as visionary. He moved that the subject be referred to the Parliamentary Committee for report.

Mr. Prevost seconded the motion, and reiterated his complaint that the vestries had not been consulted on this important project. It would be extremely unwise to give the proposed power to the Metropolitan Board, at least until the constitution of the Board was materially changed, and it showed a better disposition to consult the opinions and the wishes of its constituents.

The motion was then carried unanimously.

Metropolitan Board of Works.—In the report of the discussion on the 23rd ult., an important typographical error occurred in Mr. Leslie's speech. The daily increase in the supply of water to the Metropolis during the past year from other sources than the Thames, chiefly from the chalk, should have been 4,000,000 gallons, and not 400,000 gallons.

CONTEMPORARY OPINIONS ON THE WATER SCHEME OF THE METROPOLITAN BOARD.

[From the *Medical Examiner.*]

At the last two general meetings of the Metropolitan Board of Works the question of providing an efficient supply of water for the Metropolis was again under consideration. After very lengthy discussions, during which it became evident that the opinions of the members were by no means unanimous, resolutions were passed to the effect that the most strenuous endeavours should be used by the Board to obtain the sanction of Parliament to the double scheme of purchasing the rights of the London water companies and carrying out the recommendations of Messrs. Bazalgette, Bramwell, and Easton as to a supplemental water supply. The purchase scheme is more a financial than a sanitary question, for we do not look for any improvement in the quality of the present water supply, as a result of its passing into the hands of the Metropolitan Board of Works. On the contrary, judging from the experience of the past, the management of gas and water works by local authorities has not been attended with improved quality in the articles supplied. Commodities supplied by private enterprise are always more or less under stringent checks as to quality, which are absent where the supply is in the hands of public boards. At the present time the rapidly increasing population in the metropolitan area urgently demands a better provision for the supply of water, and the water companies are about to apply to Parliament for sanction to raise fresh capital to meet the existing demands. It is doubtful whether the proposal of the Metropolitan Board, which involves the expenditure of 5½ millions, will obtain parliamentary sanction this session, and, perhaps, still more doubtful whether it will obtain favour on the part of the public, involving, as it does, an additional three-halfpenny rate. On the score of improved quality alone, the expenditure of such a large sum of money would, perhaps, be scarcely justifiable. The present London water supply, much as it has been abused by a certain class of alarmists, is, taken on the whole, fairly good. Dr. Frankland, who is, perhaps, the most difficult gentleman in London to satisfy on the question of pure water, has admitted that the supply derived from the New River Company, the Kent Company, and the East London Company is unexceptionable in character, and these companies supply half of London. Even the quality of the water supplied by the remaining London companies, which is derived from the Thames, and known to be of somewhat doubtful character, is delivered, after filtration, of a quality sufficiently pure for all ordinary purposes. With an increase in storeage and in filtering area, there is no reason why the existing companies should not be able to deliver drinking water to London of thoroughly good quality, even if the original source of such water is the River Thames. At the same time, if an absolutely pure water supply can be obtained at a moderate expenditure from such an unexceptionable source as deep wells in the chalk, it would be, for many reasons, advisable, and the present time appears peculiarly favourable for carrying such a scheme into effect. If any radical change in the present system is effected, it is to be hoped that it will assume the form of a general measure, applicable not only to the metropolitan area, but likewise to the whole of the outlying districts.

[From the *Builder.*]

The scheme of the double water supply for London, on the unsatisfactory nature of which we commented on the first promulgation of the scheme, and again last week, received on the very day of the publication of our observations its first check, for such the result of the division on the subject at the Board of Works meeting unquestionably was. The resolution to bring in a Bill for carrying out the scheme was only passed before by a majority of seventeen against thirteen; and when Mr. Fowler, at the meeting on Nov. 23, proposed a resolution that the former proceedings in regard to this point should be rescinded, the result was that, in spite of the obvious and natural feeling on the part of a good many members against taking a step in retrogression, or, as it was said, stultifying the Board, the new motion was thrown aside by a majority of only three in a much fuller house, the numbers being in this case twenty-three to twenty. This may be called a victory by the supporters of the measure, but it is a victory very like a defeat. With such strong evidence of doubt and uncertainty in the opinion of the Board of Works themselves in regard to the project, it is not likely that those outside its circle, who already strongly object to the scheme, will be at all reassured by such a result; and we may say that in the face of this expression of vacillation the chance of such a Bill being carried is almost *nil*. The member who observed that the Board had gone to Parliament with many Bills before, and had failed, and that they would fail in this, is likely to prove a true prophet. The resolution moved by Mr. Fowler, though formally stated in general terms, referred, as he himself observed, to the scheme of a double supply in particular; and there is no doubt that "there's the rub." London is becoming so vast and complicated an institution that, after efficiency, we must in all things aim at simplicity in the mechanism of its working. The proposed scheme does half the work only of providing pure water for Londoners, and does so by doubling the mechanism of supply. And when the public begin to realize what such a plan actually means, they will be opposed to the scheme by a much more decisive majority; and the Board, in their own interests, would have done wisely to listen to the member (Mr. Cufflin) who counselled them not to go to Parliament with the Bill when they were so equally divided on the subject. The probability is, that in that case "the House" will be very unequally divided, with a large majority on the side

of the "Noes." The scheme is one so peculiar and so partial in its character that no Government would be very likely to assent to it unless it were demanded, as the best thing that could be got, by unmistakeable public opinion; and this is most unlikely to be the case. The expense of the scheme is great, and not, as yet, sufficiently estimated; the unsatisfactory nature of the result is patent to every one. It will not be nearly so much a question of cost and of increased rating as of what we shall get for this. It would be worth while to pay a great deal more even to get a complete and copious supply of good water; it is not worth while to pay a lesser, but still enormous, sum for a scheme which will only half meet that want, and will inflict a most costly and cumbersome system of supply upon us.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary Meeting of Proprietors was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 27th ult.—JULIAN GOLDSMID, Esq., M.P., in the chair.

The SECRETARY (Mr. Albert F. Jackson) having read the notice convening the meeting, the corporate seal was affixed to the register, and the following report was presented:—

The present half-yearly ordinary meeting of the shareholders has been convened, agreeably to the company's Act of Parliament, for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring a dividend for the half year ended the 30th of June last.

Gas Made.—The total quantity of gas made at all the stations in the half year ended the 30th of June last was 2470 million cubic feet. The total quantity made in the corresponding half year of 1876 was 2477 millions, showing a decrease of 7 millions. As, however, Bordeaux was included from the 1st of January to the 15th of April, 1876, for 105 millions, there was really an increase at the present stations of 98 millions.

Lights.—The total number of lights at all the stations on the 30th of June last was 1,114,885. The total number on the 30th of June, 1876, was 1,111,399. These figures give an increase of 3486, notwithstanding the loss of 52,903 lights at Bordeaux.

Mains.—The total length of mains laid up to the 30th of June last was 1110 miles. The total length of mains on the 30th of June, 1876, was 1148 miles, being a decrease of only 38 miles, although 86 miles were ceded at Bordeaux.

The condition of the several stations calls for no special remark. They have all been, as usual, maintained in good working order.

The general superintendence of the affairs of the association on the Continent has been exercised by Mr. G. W. Drory, and he has, as hitherto, received the hearty assistance and co-operation of the several engineers and agents.

The appointment in April last of Mr. Wingfield as "travelling inspector of accounts" has already been productive of good results.

The rental and profit for the half year ended the 30th of June last (1877) were less than for the corresponding half year of 1876, because in that half year Bordeaux was included for three months and a half. If Bordeaux be excluded, it will be found that the rental and profit for the half year under consideration at the stations remaining in the hands of the association show a moderate increase of 4·75 per cent. on the rental and 2·85 per cent. on the profit.

The cost of the coal used in the half year now under review was 1s. 9d. per ton less than that of the coal used in the first half year of 1876.

There was a considerable diminution in the value of two of the secondary products—viz., coke (17·75 per cent.) and tar (4·1 per cent.), but an increase in the value of the ammoniacal liquor (30 per cent.).

During the half year ended the 30th of June last considerable sums were expended in improving and increasing the purifying apparatus, and in the erection of new gasholders, more particularly at the following stations—viz., Amsterdam, Antwerp, Frankfort-on-the-Maine, Hanover, and Vienna. A considerable, but necessary, outlay for mains was incurred, principally at Antwerp, Brussels, Frankfort-on-the-Maine, Ghent, Haarlem, Hanover, and Vienna.

For the purpose of erecting new works at Schöneberg, a suburb of Berlin, and at Ghent, plots of land were purchased in the course of the last half year, during which also considerable progress was made in the erection of the buildings for new offices and dwellings at Berlin.

Allusion was made in the last report to the suit by this association against the town authorities of Brussels for the balance of moneys due from them in payment of the works sold. That suit came before the Court in the month of March last, and on the 16th of May judgment was given in favour of the association. Payment will, however, not be made until the three experts employed upon the valuation have laid before the Court the detailed items composing the aggregate sum at which they had previously fixed the value.

During the half year now under consideration contracts were concluded for lighting the Commune of Tempelhof, near Berlin, and the following suburbs of Vienna—viz., Hietzing, Penzing, Simmering, and Währing.

The president and directors would now draw the attention of the shareholders to the accounts for the half year ended the 30th of June last.

These have been duly audited, and from them the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profits of the association for the last half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—namely, a dividend of £2 and a bonus of 10s. per share, payable, free of income-tax, on and after the 15th of December next.

In conclusion, the president and directors have to inform the shareholders that, in accordance with the advice of counsel, they propose to apply this next session to Parliament for an Act to authorize the £6 5s. per share, still unpaid upon the 56,000 shares of the association, to be written up as paid out of the "amount appropriated to meet contingencies, or for enlarging, repairing, or improving the works."

Power will also be taken to deal hereafter with other amounts placed to the credit of this fund, to introduce some slight variations as to the qualification and quorum of directors, and to simplify the scale of voting, in order, if it should be deemed advisable, to be able to facilitate the conversion of the shares of the association into stock.

The provisions of a Bill for these purposes have been carefully considered by the board, and will at the proper time be submitted for the approval of the proprietors.

The CHAIRMAN: Gentlemen, you have heard the report on the half year ending the 30th of June last, and what I have to say to you will be limited to a very few words. We have, perhaps, been somewhat more full in our report than we have been on some previous occasions; but the business of the association is so large, and the facts are so many and interesting, that we have thought it right to endeavour to give the shareholders, in the report itself, every possible information. The main fact, you will observe, is that, notwithstanding the extraordinary and general depression of business on the Continent, we have been able to maintain ourselves in at least as good a position as we were in this time last year, because if we exclude the station which we have sold—the station of Bordeaux—we find that we have a small increase of rental—an increase of 4¾ per cent., and an increase of profits amounting to 2·35 per cent. When we consider the lamentable statements which many companies have had to make during the last year with regard to the results of their business, I do not think we have much reason to complain of what has occurred in this company. I was reminded, as I came up to this room, and saw a notice of a meeting now being held below, of a circumstance to which I called your attention at a former meeting of this association. At the present time my right honourable friend (Mr. Goschen), the colleague of my excellent friend and predecessor, Mr. Twells, is presiding over a meeting of an unfortunate company. Just as on the previous occasion he was presiding over a meeting of Egyptian Bondholders, and informing them what was going to be done to endeavour to get a dividend at all. We fortunately are not in that position; we get a dividend, and, I think I may say, a good dividend. Your directors point out in their report that they have been endeavouring, as far as possible, to improve several different departments of the business, and I think that one of the most important of these is one to which perhaps many of the shareholders do not attach much consideration—I mean the purifying department. Now this does not sound very inviting perhaps, but it is a matter of great importance that all our purifying apparatus should be in complete order, not according to principles which existed some ten, fifteen, or twenty years ago, but according to the most modern discoveries and practice. And when we find that the result of what we have done in the last few years in that direction is that we are able to increase our returns for ammoniacal liquor by 30 per cent., I think that you will agree with me that this is a matter well deserving our serious attention. The ammoniacal liquor is a secondary product which, up to the present time, has not occupied any very important part in the results of our working; but I believe that in time to come it will do so, and that, if we spend considerable sums of money in perfecting our apparatus generally, according to the most advanced theories of modern science, we shall reap the benefit of such outlay hereafter. With regard to the general results of the business, one thing is quite clear, and that is that, unless the price of coal had been as low as it has been, we should not have been able to maintain our average profits or dividend. The price of coal has been during the last half year 1s. 9d. per ton less than it was in the corresponding period of 1876; but, of course, there is something to be said on the other side. As the price of coal has been low, the price of coke has been at least proportionately low, and you know that coke is the most important of our secondary products. This is a question to which we are turning our most earnest attention, and we are endeavouring to foster and promote as far as possible the sale of coke. But there are great difficulties in the way, and, when business is at a low ebb, there are always other products to compete with us. We have done our best to effect sales of coke in the last half year, but at some of our stations, I regret to say, our stocks are much larger than we like to see them. I am afraid that our engineers will tell us this is the general result of a mild winter on the Continent. Last winter was an exceptionally mild one, and the result is shown in our coke heaps. If present prospects are to be trusted, the coming winter will be severe, and the results, as far as we are concerned, will, I hope, be satisfactory. I do not know that I have much more to state. We have been stirring in every department. Mr. Wingfield has been most active in his first investigation of the accounts at the different stations, and the board are thoroughly justified in stating in their report that, up to the present time, we have every reason to be well satisfied with the results of his appointment. I would only say, therefore, in moving—"That the report on the affairs of the association, which has been read, be received and entered on the minutes," that it is a report which I think, on the whole, should meet the approbation of the proprietors. Sir Moses Montefiore, our esteemed president, has written—as usual, when not able to attend the meeting—expressing his regret that he cannot be present, and adding that he agrees with us in thinking the report is a satisfactory one. I do not know that it is necessary to add anything with regard to the intended promotion, by your directors, of a Bill in Parliament. The question has been discussed at previous meetings, and I know the shareholders are aware of the intentions of the board of directors (which, I believe, entirely coincide with the views of the shareholders). It is therefore not necessary or desirable to detain you any longer by referring to the matter; but, having stated my willingness to answer any questions that may be put to me, I will at once conclude by moving the reception and adoption of the report.

Mr. JOHN RICHARDSON seconded the motion.

Mr. HORNCASTLE: As a new shareholder, I may, perhaps, be excused for asking a question. My impression is that you have been adding the interest received on the reserve-fund up to the present time to the reserve-fund. Is that so?

The CHAIRMAN: Yes.

Mr. HORNCASTLE: I understand that you have expressed your intention of limiting the reserve-fund to £250,000. Do I understand that the interest in the future is not to be added to the capital sum, because that would be virtually increasing it beyond £250,000. Is it to be divided among the shareholders instead of being added to the reserve?

Mr. BADDELEY: There is one subject which has lately very much interested the shareholders in gas companies—namely, the electric candle. Can you give us any information with reference to it, and whether it is likely to affect any of the stations of the company.

The CHAIRMAN: If no other shareholder desires to make any inquiry, I will at once answer the two questions that have been put to me. As to the reserve-fund, the interest has always been added to it. I think we (the directors) have not come to any resolution to limit the amount of that fund to £250,000—in fact, with the latest additions, we have now to the credit of the reserve-fund £250,000 of stock, which is not £250,000 in cash. In my opinion, it is desirable that the interest should continue to be added to it, and I should strongly advise the board and the shareholders to adopt that course. The honourable proprietor will understand that in saying so I am now only expressing my personal views on the question. With regard to the electric candle, I think it can only be looked upon as one of those "scares" which are now and then indulged in. It is said that there is a panic in the City once in every ten years. In gas matters "scares" come oftener. Our opinion is that, if anything comes of the electric candle, it will be rather in the direction of stimulating our business. We think that for many reasons there is no probability of the electric candle being used for private lighting, and that if it is used for public lighting, it will take the less advantageous part of our business off our hands. I am not afraid of the electric candle doing any damage to the interests of the Imperial Continental Gas Association.

The motion was put and carried unanimously.

The CHAIRMAN: I have now to move—"That a dividend of £2 per share and a bonus of 10s. per share be declared upon the 56,000 shares of the association for the half year ended the 30th of June last, and that the said dividend and bonus be payable, free of income-tax, on and after the 15th of December next."

Mr. TWELLS, M.P., seconded the motion, which was put and carried.

Dr. S. HADEN-HADEN: Before we leave the meeting, I think it is our duty to pass a vote of thanks to our chairman for the very able manner in which he has presided over our proceedings, and in that vote we should also express our obligations to the board generally for the great attention and skill they have shown in conducting our business during the last half year. I am quite sure that, while our affairs are in their care, we are in very good hands. As a practical and scientific man, I may take this opportunity of saying, in reference to an inquiry that has been made in the meeting, that I think we have nothing to fear from the electric candle. In the course of time the nonsense that is talked about it will be all over, and our business will continue to go on steadily. I move—"That the cordial thanks of the meeting be given to the president and directors for their able management of the affairs of the association, and to the chairman for his conduct in the chair this day."

The motion having been adopted,

The CHAIRMAN said: Gentlemen, we are much obliged to you for your vote of thanks. We are also very glad to have the opinion of a gentleman thoroughly competent to express one on the subject which has just been alluded to by the honourable proprietor. We, as your directors, shall continue to do our best in your service, and we hope that in the future all our proceedings will be as harmonious as they have been to-day. I now ask you to adopt the usual vote of thanks to Mr. G. W. Drory, the general superintendent of the affairs of the association on the Continent, and to the agents, engineers, and other officers of the association.

The motion having been carried, the proceedings terminated.

BAHIA GAS COMPANY, LIMITED.

The Ordinary Half-Yearly General Meeting was held at the London Offices, on Tuesday, Nov. 27—EDWARD HORNER, Esq., in the chair.

The SECRETARY (Mr. A. J. Head) read the notice convening the meeting, and the following report and statements of account were presented:—

The directors herewith present the audited statement of accounts for the half year ending June 30, 1877.

During the past half year considerable progress has been made in laying the enlarged mains alluded to in previous reports, which had been recommended by the engineer in order to diminish the excessive leakage.

The capital of the company being all paid up, it will be necessary to provide means for the payment of the cost of the enlarged mains, and accordingly a resolution will be submitted to alter the 77th Article of Association of the company, so as to enable the directors, with the sanction of a special resolution passed by the company in general meeting, to borrow such sum or sums as may be required.

The profits for the half year, £4172 0s. 10d., added to the balance brought forward, makes the sum of £4408 0s. 9d., out of which the directors recommend the sum of £500 to be carried to the reserve-fund, and the payment of the preference dividends of 10 and 7½ per cent. respectively for the half year, and that a dividend of 3 per cent. per annum be paid on the ordinary shares. This will absorb £4125, leaving £283 0s. 9d. to be carried forward.

The directors retiring by rotation are Mr. Joseph Quick and Mr. Horatio Brothers. The auditor retiring is Mr. Joseph Wright. They offer themselves for re-election,

Dr. *Balance-Sheet, for the Half Year ending June 30, 1877.* *Cr.*

Capital—				Concession	£7,000	0 0
5000 ordinary shares	£100,000	0	0	Investment to Dec. 31, 1876	97,352	12 3
1000 10 per ct. preference shares	20,000	0	0	Additional during half year	3,661	14 5
1500 7½ ditto ditto	30,000	0	0	Freehold land	4,705	2 7
Creditors—				Meters fixed	2,987	17 4
On open accounts	1,174	0	5	Office furniture and fixtures at Bahia and in London	380	16 10
On acceptances	10,406	7	0	Preliminary expenses	16,914	17 3
Dividends unpaid	171	0	7	Suspense account—		
Insurance-fund	47	4	10	Extension of retort-house, &c.	948	14 1
Reserve-fund	2,500	0	0	Mains renewal	3,735	0 3
Profit and loss	4,408	0	9	Plant	602	18 1
				Amounts due for gas, fittings, &c.—		
				Public lamps	1,518	10 11
				Ditto establishments	4,546	12 3
				Private rental, fittings, and coke	6,243	3 0
				Sundry debtors	456	18 6
				Stock—		
				Coals	5,796	3 10
				Coke	81	18 0
				Fittings	3,652	2 3
				Mains, lamp-columns, and other materials	1,954	8 8
				Goods in transit	1,050	16 8
				Bills receivable	1,500	0 0
				Cash at bankers—		
				General account	2,079	14 8
				Dividend account	171	0 7
				Bahia	866	13 5
				London office	3	11 4
				Bahia office	495	6 5
	£168,706	13	7		£168,706	13 7

Revenue Account.

Coals carbonized	£5,378	8	2	Gas supplied to public lamps	£9,427	16 9
Purifying materials and wages	295	0	4	Less fines	221	4 5
Carbonizing wages	1,199	2	2		£9,206	12 4
Wages, yardmen, &c.	205	12	11	Private consumers	5,880	13 7
Repairs, mains, and services	698	12	6	Public establishments	1,498	16 9
Lighting and repairing of public lamps	1,364	15	4	Meter-rental	529	9 7
Salaries	1,805	14	2	Products £1,609 5 11		
Directors fees	400	0	0	Less labour 71 13 9		
Auditors fees	21	0	0		1,537	12 2
Rent and taxes	207	12	6	Transfer fees	1	0 0
Interest	108	1	0	Profit on fittings	185	7 8
Stationery	88	11	1	Bad debts recovered	40	13 5
Office expenses	26	14	6	Exchange	13	11 1
Trade charges	162	10	7			
Travelling expenses	42	19	6			
Wear and tear	1,235	15	8			
Bad debts and allowances	82	17	10			
Law charges	17	6	0			
Extraordinary disbursements—						
Extension of retort-house, &c.—						
One-sixth of £3951 11s. 5d. (last instalment)	658	11	11			
One-sixth of £1078 19s. 6d. (5th instalment)	179	16	7			
One-sixth of £1274 16s. 3d. (4th instalment)	212	9	5			
One-sixth of £687 17s. 9d. (3rd instalment)	114	12	11			
Renewal of mains—						
One-sixth of £585 16s. 5d. (2nd instalment)	97	12	8			
Renewal of plant—						
One-sixth of £707 7s. 11d. (2nd instalment)	117	18	0			
Balance—profit	4,172	0	10			
	£18,893	16	7		£18,893	16 7

Profit and Loss Account.

Dividend declared May 29, 1877	£3,625	0	0	Balance of account to Dec. 31, 1876	£4,360	19 11
Reserve-fund	500	0	0	Revenue account, net profit for the half year ending June 30	4,172	0 10
Balance	4,408	0	9			
	£8,533	0	9		£8,533	0 9
				Balance brought down	£4,408	0 9

The CHAIRMAN, in moving the adoption of the report, said the consumption of gas during the half year had remained much as it was before. There had been little or no increase, probably arising from the bad state of commercial things generally. The most favourable feature in the accounts now presented was the diminution in the cost of coals. The total cost, including purifying materials and wages, and carbonizing wages, was £6872, as against £7336 in the corresponding period of 1867. Probably, it would not do to expect that the charges under this head would remain so low, as, though coal might continue cheap, there was a great tendency in the Brazilian trade to fluctuations in freights. At present they were comparatively light, and the company were still chartering ships at the same rates as last year, but it would not be wise to calculate upon being able to do so for a long period. The other charges in the accounts varied very little indeed from former statements. Salaries were something less, also trade charges, but bad debts and allowances he was not quite sure about. Mr. Muriel being absent, the officials in charge at the time might not have liked to take the responsibility of writing off some accounts that were doubtful. On the other side of the account, it would be seen that the company had received slightly more for the public lamps—about £160 or £170—than in the corresponding period of 1876. Since the report had been prepared, 42 new public lamps had been erected, which would make it all the better for the revenue in the future. Coke presented a similar item to that in the former account, but in reality it was better, because on the present occasion the labour was deducted, which had not heretofore been done. During the past year the company had been laying out a considerable sum of money, under the advice of the engineer, in the enlargement of the mains, the original mains having been found too small for the distance they had to go. He (the chairman) understood that Bahia was a very difficult place to deal with, and probably this circumstance might account for the great leakage from which the company had suffered. One portion of the new system of mains was finished in April last, and the second not until August, so that there had been no opportunity of judging of the advantages to be derived from it. The last accounts from Bahia showed that the leakage had been reduced, although it was still much larger than it ought to be in any gas-works. It would be observed that the investment in the concern had increased somewhat. It was now £101,014, as against £97,000 at the corresponding period of last year. This, no doubt, to some extent, was occasioned by the cost of the pipes that had been laid down. Speaking generally, the differences in accounts were very slight. Taken together, they were something better than in December last, but £450 worse than in June, 1876. He hoped that by the outlay which had been made in new mains the directors would be able soon to report a satisfactory reduction in the leakage.

Mr. H. BROTHERS seconded the motion, which was put and carried.

The CHAIRMAN then moved the declaration of the dividends recommended in the report.

Mr. CLARKE seconded the motion, which was put and agreed to, the chairman having stated that the directors must wait remittances before paying the dividends.

Mr. W. ANDREWS moved the re-election of Mr. Joseph Quick as a director, which was seconded by Mr. R. KING and carried.

Mr. MAGNUS OHREN moved the re-election of Mr. Brothers as a director. Mr. FOGG seconded the motion, and it was agreed to.

Mr. BROTHERS, in acknowledging the confidence again placed in him, said he had brought the knowledge he possessed on gas matters to bear upon the affairs of the company, and done the best he could to promote the prosperity of the undertaking. There were great difficulties connected with the management of a concern 5000 miles away—difficulties unknown in England—and it was very depressing sometimes to realize the non-success of their efforts. Still the directors persevered in their exertions, and he hoped shortly they would have better results to show.

Mr. H. P. STEPHENSON asked whether the board were in a position to give the meeting any information respecting a recent large fire at Bahia.

The SECRETARY said he had made inquiries at the Northern Insurance Company's office, and found that it was confined to five or six houses in the Rua Novo da Commerçio.

Mr. JOSEPH WRIGHT was re-elected an auditor, and acknowledged the compliment thus paid to him.

The CHAIRMAN said in accordance with the notice that had been given, it was now for him to submit the alteration which the directors proposed to make in the 77th Article of Association. It was necessary, to enable the board to raise a sum of money to pay for the new mains which had been sent out to Bahia. Up to the end of June last, the directors had expended £8760 for that section of the mains laid up to April, and the further section which came into use in August. To complete the system, as recommended by their engineer, they had recently shipped some more mains, which, with the expenses upon them, would cost about £1200. It was well known that it was essential to have mains of adequate capacity, in order that there might not be an undue pressure required for the supply of gas, as such pressure was a great source of leakage. The directors hoped that the mains now laid would materially assist the working of the company, and prove a source of profit by the reduction of the excessive leakage. The alteration in the 77th Article now proposed, was to omit the words which enabled the directors, from time to time, to borrow money for the purposes of the company until the sum of £20,000 was raised, without any further authority than a resolution of the board, and to substitute words enabling them to raise money "with the sanction of a resolution passed by the company in general meeting." The directors did not wish to do anything without the knowledge and sanction of the proprietors, and if the alteration was now made in the rule, they would call a special meeting on that day fortnight to enable them to raise the money required on debentures. They would ask for power to raise £10,000 at 6 per cent. He moved a formal resolution sanctioning the alteration.

Mr. A. J. KING seconded the motion. He said the shareholders would hardly be surprised that the directors asked power to raise £10,000 on debentures. If they would cast their eyes over successive balance-sheets for the last three years, they would see what heavy expenditure the company had been put to, without having raised any fresh capital. During that period they had disbursed out of revenue, for "Extraordinary disbursements," as per statement at the foot of those accounts, £8613 12s. 2d. The "Suspense account," according to the present balance-sheet, amounted to £5286 12s. 5d., and the "Investment account," which, in December, 1874, stood at £93,236 12s., was now £101,014 6s. 8d., showing an increase within the three years of £7777 14s. 8d. The "Redeemable preference shares," outstanding on Dec. 31, 1874, had since been paid off, amounting to £5420, and the company had now a "reserve-fund" of £2500. If to this was added the balance now standing to the credit of profit and loss, £4406 0s. 9d., *plus* the debit balance in December, 1874, £387 2s. 6d., and the amount paid in dividends during the interval, £12,573, it would be seen that no less than £47,166 had been expended out of the revenues of the company in the last three years, without one shilling of fresh capital having been raised. It would not, therefore, be matter of surprise that the directors were at length obliged to come for power to raise more money. If they did not do so, they must lay the revenue account under contribution from year to year, till the amount now required was paid. The position of the undertaking could not be considered unsound. There was a sum of £11,580 due on open accounts and acceptances, against which the company had in cash and bills receivable, £5116, leaving a balance of only £6464. To cover this they had realizable assets in stocks and debts amounting to £25,295, all of which would become liquid in due course. Financially, therefore, the position of the company was satisfactory, and the directors were not coming before the meeting *in formâ pauperis* on this occasion. As to the revenue returns, it would be seen that, after paying for extraordinary disbursements during the half year, £1381, and placing £500 to the reserve-fund, they were able to pay 3 per cent. on the ordinary shares, so that the revenue was really showing a profit equal to nearly 7 per cent. The gas-rental during the last half year had not been quite so satisfactory as before, which was no doubt accounted for on the simple reason given by the chairman—namely, the loss by leakage and unaccounted-for gas. No doubt, if they ever reached a normal rate of leakage, the amount thus saved would go far to make a respectable dividend of itself. It was too early to look for results at present as the only mains connected at the date

of the accounts were those in the Itapigipa district, and these were only connected the last week in April, and, therefore, could not sensibly affect the returns. The engineer, however, reported that the results were satisfactory. The other improvements also, which had been effected during the last three years were beginning to show fruits, and he hoped that, with a little more patience, the directors would be able to present a better balance-sheet and revenue account than they had ever hitherto done.

The CHAIRMAN, in answer to questions by Mr. ANDREWS and Mr. LETCHWORTH, said the proposed debentures would be issued for five years, at 6 per cent. interest, and would, in the first instance, be offered to all classes of the shareholders.

The motion was then put and carried.

Mr. GUYATT moved a vote of thanks to the chairman and directors.

Mr. MAGNUS OHREN seconded the motion, which was put and carried unanimously.

The CHAIRMAN acknowledged the vote, and the proceedings terminated.

ORIENTAL GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders was held at the London Offices of the Company, Great St. Helen's, on Thursday, the 29th ult.—JAMES SYDNEY STOPFORD, Esq., in the chair.

The SECRETARY (Mr. A. Hersee) read the advertisement convening the meeting, and the following report and accounts were presented:—

The directors submit herewith a statement of accounts for the 12 months ended on the 30th of June last, and have pleasure in reporting that the business of the company has, during the financial year, made satisfactory progress.

In public lighting there has been an addition of 110 lamps—namely, 55 in the streets of Calcutta, 43 on the Jetties, 8 on the Maidan, and 4 at Howrah.

In private lighting the increase of consumers during the year was 99, compared with 65 in the previous year, and the additional lights were 1890, compared with 1514. The number of bazaar lights in use on the 30th of June last was 576, being an increase of 61 burners. It is encouraging to find that the liberal reduction in the price to private consumers, recently conceded by the company, is causing a more extended and general use of gas. There has also been an increase in the consumption at Howrah.

The shareholders will be gratified to learn that the construction of the cast-iron tank and the erection of the columns and framework for the new gasholder have been successfully completed. Great difficulty was experienced in excavating in such a treacherous soil, but, owing to the careful attention of the manager, the work has been accomplished without any serious drawbacks. The riveting together of the gasholder is being proceeded with, and the entire work is expected to be finished by the end of December next.

Every care has been exercised to maintain the works and machinery of the company in an efficient condition. The length of new mains laid during the year was 2 miles 137 yards, and nearly the same quantity of pipes were relaid. The drainage works of the corporation continue to damage the mains, and the constant vigilance of the company's staff is required in effecting the necessary repairs.

The directors have to report, with deep regret, the decease of their late esteemed colleague, Walter Thomas Fawcett, Esq., who had been a director of the company for upwards of 20 years, during 12 of which he filled the office of chairman. They desire to testify to the ability and valuable assistance which Mr. Fawcett at all times rendered to the undertaking. In conformity with the regulations of the company, the directors provisionally appointed Charles Hill, Esq. (an original shareholder, and a gentleman intimately associated with the formation and subsequent progress of the concern), to fill the vacancy at the board, and the confirmation of this appointment is asked at your hands.

Intimation was given in the last annual report that exchange would have an unfavourable effect, and it is disappointing to find that this item has pressed very heavily on the profits of the past year.

The local affairs of the company continue under the careful supervision of Messrs. E. Broughton, R. C. Noble, and H. W. J. Wood.

The engineer and manager, Mr. Blackburn, has exerted himself with his usual zeal and ability in conducting the business of the company, and his services in connection with the erection of the new gasholder deserve special mention.

The general revenue account shows a balance (after crediting £1681 to the reserve-fund) of £15,298 6s. 4d., out of which the directors recommend a distribution of 5 per cent., free of income-tax, payable on the 4th prox., making, with the interim payment of 4 per cent. on the 4th of June last, a total dividend of 9 per cent. for the year.

The retiring directors are Charles Hill and William White, Esqrs, and the retiring auditors are Henry Lawrence Hammack and Thomas Newton Stokes, Esqrs. All are eligible for re-election, and offer themselves accordingly.

Balance-Sheet, June 30, 1877.

Dr.				*Cr.*			
30,000 shares of £5 each.		£150,000	0 0	Amount of plant on the 30th of June, 1876		£282,799	4 10
29,996 " " (50s. paid)		89,988	0 0	Outlay during the past 12 months		10,972	17 8
4 " " (50s. paid)		10	0 0				
		£239,998	0 0				
Loans on debentures		76,270	0 0	Cost of plant to the 30th of June, 1877		£293,772	2 6
Reserve-fund		11,681	0 0	Services laid and meters in use		7,651	14 4
Unclaimed dividends		595	16 11	Amount due to the company		6,523	12 10
Amount due by the company		11,122	5 4	Value of stocks, viz.—			
Balance from general revenue account		15,298	6 4	Coals	3,342 17 4		
				Purifying material	390 2 5		
				Products	126 0 8		
				Fittings and meters	5,763 10 7		
				Pipes	3,441 19 1		
				Horses, conveyances, &c.	374 0 0		
				Sundry stores	6,774 5 2		
				Office furniture, &c.	363 2 6		
						25,575	2 6
Cash in Calcutta						20,602	4 3
Cash in London						5,839	16 11
		£354,965	8 7			£354,965	8 7

Profit and Loss, or Working Account, for the Twelve Months ending June 30, 1877.

Manufacture & distribution—Coals used, purification, and wages		£18,772	2 7	Gas-rental		£47,732	13 2
Salaries in India & London		2,968	10 7	Coke, tar, fittings, &c.		13,243	13 11
Directors and auditors		913	0 0	Transfer fees		16	17 6
Passage & general expenses		715	4 6				
Exchange		4,279	13 5				
Reserve-fund		1,681	0 0				
Mains account		2,579	10 7				
Wear and tear and repairs		2,062	12 10				
Retort account		900	17 5				
Bad debts and allowances		74	19 4				
		£34,947	11 3				
Balance		26,045	13 4				
		£60,993	4 7			£60,993	4 7

General Revenue Account, June 30, 1877.

Dividend of 5 per cent., balance of 9 per cent. for the 12 months ending the 30th of June, 1876, declared at the general meeting, November, 1876		£11,625	0 0	Balance on the 30th of June, 1876		£14,611	11 0
Interim dividend of 4 per cent., on account of year ending the 30th of June, 1877, paid June 4		9,600	0 0	Ditto on profit and loss account		26,045	13 4
Interest on debentures		3,808	14 9				
Income-tax		325	3 3				
		£25,358	18 0				
Balance		15,298	6 4				
		£40,657	4 4			£40,657	4 4

The CHAIRMAN said before moving the adoption of the report he must express the regret of the board at the loss the company had sustained during the past year in the death of Mr. Fawcett, who filled the office of director for many years, and who was most energetic in promoting its welfare in every way up to the last. To fill the vacancy caused by his death the board had elected Mr. Charles Hill, formerly a partner of Mr. Fawcett, and one of the fathers of the Oriental Gas Company. Mr. Hill had retired from business, and was willing to devote his time and talents to the service of the company, which the board looked upon as a valuable acquisition. Mr. Hill came before the present meeting for re-election by rota, and the board hoped that the shareholders would express approval of the step they had taken, by an unanimous vote. Referring to the report, the chairman said he thought he might congratulate the meeting on the general aspect of the company's affairs. There had been an increase in the lighting, both public and private, and there had been some decrease in the expenditure, which was very satisfactory; and but for the low rate of exchange from India there would have been a very substantial addition to the profit on this occasion. The public lighting had increased, as the directors in their last report told the shareholders they hoped it would, and there was a prospect that further orders for public lamps would be received, as the funds of the Municipality would allow. The private lighting had also increased satisfactorily. Last time the directors met the shareholders, they were disappointed that the reduction which they had voluntarily made in the price of gas had not been recouped. Their expectations, however, were now realized in a great measure, and the amount of the reduction had been rather more than recouped. It was true that, on comparing the printed reports, the shareholders would find the rental was £1400 less than in the previous year; but then it must be remembered that, in the accounts for 1876, the rental was increased by an exceptional receipt of £1600 from the illuminations which took place on the visit of the Prince of Wales to Calcutta. The directors were very sanguine that the rental would continue to improve, and thus repay the company for the temporary loss incurred by their liberal concession. They had interested the gas-fitters to canvass for customers by giving them a small bonus for every new customer obtained, and this arrangement seemed to work very well. The bazaar lights had increased during the year. The company were careful in their selection of this class of consumers, and they believed they were now paid for all the gas so consumed. Residual products sold very freely in Calcutta at market prices. The value of coke was a good deal influenced by the price of coal; tar was affected by importations from England, and the price was rather low, as the directors were obliged to keep down the price to prevent competition in that way. The excavations for the cast-iron tank had proved very difficult, and caused some anxiety. To excavate to a depth or 30 or 40 feet in a soil like that of Calcutta was a serious business; but the company's engineer, Mr. Blackburn, had given his personal attention to the matter, and the tank was now safely in its place. The erection of the gasholder was, in comparison, a small affair; it was being proceeded with, and the directors hoped it would be completed in a few weeks. The company would then possess a gasholder, the like of which was not to be found in India; it was of unusual strength, and would, he felt satisfied, stand any cyclone which might happen. The company had suffered severely from the drainage works of the Municipality. The damage was not intentional, but arose from the natural sinking of the soil, sometimes long after the completion of the work, and this caused the company's pipes to strain and break. Their engineer and all the officials were constantly on the look-out to remedy defects, and the evil was diminishing, although for a long time to come it was to be feared there would exist the necessity for keeping an extra staff to repair the damage. The leakage for the last year was 3,360,000 cubic feet less than the year before, which was very satisfactory, considering that the reduction of the previous year was 14½ millions over its predecessor. The rate of exchange was the company's *bête noire*, and it was difficult to know what to think about the future. The effect of the adverse rate was painfully evident in the report, the loss thereon being no less than £4279 on remittances of £25,500, or about 1¾ per cent. on the company's capital. It was hardly fair, however, to take the rupee at 2s.; its intrinsic value being only 1s. 10d. or 1s. 10½d. when the price of silver was 5s. per ounce. It was formerly remitted to England as bullion, and realized that rate; but now it was a little below 4s. 6d. Some persons anticipated a rise in the value of silver, and he hoped it would take place, for it was a matter of considerable importance to the company. The Calcutta Committee still continued to give their careful attention to the affairs of the company, and did valuable work in the way of general superintendence, and the board could not speak too highly of the services rendered by the engineer, Mr. Blackburn who, notwithstanding several severe attacks of illness, had done unusually hard work during the past year, and had done it entirely to their satisfaction. He would conclude his remarks by reading a short extract from the last report of the Calcutta Committee, which was so gratifying that he thought the shareholders ought to hear it. They said: "The committee desire to congratulate the board upon the largely increased quantity of gas sold to private consumers during the past few months, and they hope that the continuous increase of prosperity which has been so long anticipated may now be realized. The recent liberal reduction in the price of gas, the bonus offered to the gas-fitters for each new light obtained, and the protection now afforded to new consumers by the rigid inspection of all new fittings, should, together, have the effect of inducing a large accession of new customers. The committee look forward with confidence to the attainment of this result, and hope that the increased quantity of gas sold during the coming year may not only be sufficient to cover the loss of revenue already experienced by the reduction in price, but that a large additional consumption may be produced." He then moved the adoption of the report of the directors.

Mr. WHITE seconded the motion.

The CHAIRMAN, in answer to a proprietor, said the Municipality required several more streets to be lighted, and were about to give the company an extension of their contract; but, although the main terms were agreed upon, the contract had not been signed, and it was not prudent, therefore, to say more than that it was in satisfactory progress, and the directors believed that its results would be advantageous to the company. The company's stock of coals was not large, but their sources of supply were near, and storeage was unnecessary in Calcutta. The stocks of fittings, meters, &c., were all estimated all their real value. The company had no power to send produce to this country instead of money, and if they had, he doubted whether they would do any good by it.

Mr. WHITE said it had been tried in another company, and found to be a mistake.

The motion was put and carried, and the retiring directors and auditors were re-elected and severally returned thanks.

Mr. HILL, in answer to a shareholder, said that he knew no reason why this company's shares were quoted at a lower price in the market than those of the Bombay Company, which paid a lower dividend, except the fact that there were very seldom any transfers, and so there was but little market for them.

The CHAIRMAN moved the dividend recommended in the report.

Mr. Hill seconded the motion, which was put and carried.

The Chairman said he thought the shareholders would not like to separate without expressing their thanks to the Calcutta Committee, and to Mr. Blackburn, for their valuable services, and in proposing such a vote he included the name of Mr. Hersee, the secretary.

Mr. White seconded the motion.

The Secretary returned thanks on behalf of Mr. Blackburn and himself for this mark of the approval and confidence of the shareholders, and said it would prove a great stimulus to renewed, and, if possible, greater exertions.

A vote of thanks was cordially given to the directors, which having been acknowledged by the chairman, the proceedings terminated.

GAS AFFAIRS AT INVERNESS.

On Monday, Nov. 19, a Special Meeting of the Inverness Police Commissioners was held—the Provost presiding—for the purpose of considering a minute of the Gas and Water Committee, recommending that the price of gas should be reduced from 8s. 4d. to 7s. 6d. per 1000 cubic feet, the change to take effect from the 15th of May last.

The Provost having moved the adoption of the minute,

Mr. Joseph Mitchell, C.E., while approving of the reduction, complained that the price of gas in Inverness was, even after the reduction, exorbitant; and it was quite clear, considering the present price of coals, that the commissioners were working the gas concern in a most extravagant way. In almost all other towns throughout Scotland, the price of gas ranged from 3s. to 4s., and from 5s. to 6s. per 1000 cubic feet. The only reason put forward for the high price in Inverness was the high land carriage they paid for coals. Now, the land carriage of coals paid in Montrose was 7s. 9d. per ton, while in Inverness they paid 10s. The difference should add 2½d. or 3d. to the 1000 cubic feet of gas; therefore the price should not exceed that in Aberdeen, Montrose, or such places, by more than 3d. or 6d. at the farthest. The price in Aberdeen was 4s. 10d., and in Perth 4s. 2d.; and why they should assess at 7s. 6d. in Inverness he could not understand. He also complained that, instead of the commissioners having brought about an improvement in the management of the gas-works, they had actually incurred, during the last twelve months, £300 expenditure more than was incurred in the management by the old company. The waste of gas had risen to the extraordinary proportion of 30 per cent. of the manufacture, whereas, under Mr. Stivens's management, it ranged from 22 to 25 per cent. The manager should be asked to direct his attention to the subject, and to ascertain how such a dreadful waste was occasioned. He was glad that the provost's motion had been agreed to, that the gas manager at Aberdeen should be invited to visit Inverness, and to report on the works, in order that the commissioners might be enabled to put right what might be found defective, and to reduce still further the price of gas, which he considered to be disgracefully high. They had, during the last twelve months, been working in the dark, notwithstanding that they enjoyed the counsels of Bailie Macbean, who was a first-class engineer, and who had said to him that he knew more about water-works than Mr. Bateman.

The Provost read the estimate of expenditure and income for the current year. The gross income was estimated at £7535. Deducting the estimated expenditure, the profits would amount to £455. After mentioning the leading details of both sides of the annual accounts, he read a report from Mr. Thomson, the manager of the gas-works, which stated that, since the commissioners took over the gas-works, the quantity of gas produced was 32,728,000 cubic feet. The quantity sold during that time was 22,870,000 cubic feet, to which had to be added, say, 51,000 cubic feet consumed at the works. The quantity unaccounted for was thus 9,800,000 cubic feet, or a loss of 29·94 per cent. The laying down of 60 tons of pipes in the streets had been accomplished, and the state of the old pipes taken up fully justified their removal. A great cause of leakage or waste, Mr. Thomson stated, was the street-lamps, which were badly fitted up; and another cause was the high pressure which had to be kept in the mains in order to ensure a good light throughout the evening. Mr. Thomson made several suggestions in the way of improvement, and trusted they would soon be able to reduce the large proportion of unaccounted-for gas. Proceeding with his remarks, the Provost said that, as Rome was not built in a day, so they could not expect to have the gas-works all at once in a condition that would enable them to reduce the price of gas very materially, or to stop the dreadful waste to which Mr. Mitchell had referred. But, in order that they should accomplish these things, he had proposed some days ago that Mr. Smith, the gas manager at Aberdeen, should be sent for, to report, as a competent, experienced gentleman, on the state of the Inverness works. He was sorry they were not in a position now to reduce the rate to 6s. 8d.; but the commissioners would hereafter be enabled to effect a great reduction gradually, year after year. He believed thoroughly in the working qualities of the present manager, who was a good engineer, and also had fought manfully against a great many difficulties in the working during the past year.

Mr. Alexander Macbean seconded the Provost's motion, and expressed great astonishment that Mr. Mitchell should have brought his name into the discussion. Mr. Mitchell had indicated that he (Mr. Macbean) was no engineer; but, if he had been an engineer, and had anything to do with the engineering of the water-works, he would have saved at least from £1200 to £1400 on the cost of the works at the outlet of Loch Ashie alone. If he had been an engineer, like Mr. Mitchell, and a shareholder in the old gas company, he would have exerted himself, at the time of the passing of the Act of Parliament by which the works were transferred, to have got powers in the Act that would have compelled the company to part with their works at a fair, honest price, that paid by the corporation being exorbitant—£150 for every £100 of capital. The works were rotten, and were not worth a sum of £50 per £100 less than what was paid for them. Mr. Mitchell was now pocketing from the ratepayers 6¾ or 7 per cent. on the stock he held in the old company, and how could he expect that Inverness could compete in the price of gas with Aberdeen and Dundee, where the corporations paid only 4 or 4½ per cent., while Inverness paid 7 per cent.

Mr. Mitchell: Why did you give that price?

Mr Macbean proceeded to say that Mr. Mitchell was in London at the time the Act of Parliament referred to was passed, and why did he not then attend to the interests of the public in the way he had just indicated? It was all very well for him to come down now to Inverness, and make speeches on occasions on which the reporters were present; but the public of Inverness knew very well all that had happened, knew very well that the exorbitant price paid to the shareholders of the old company for their works rendered it impossible for the Police Commissioners to give gas at the rates at which it was supplied by the corporations of such places as Aberdeen and Dundee. He could not help thinking that if Mr. Mitchell and the other shareholders of the old company had done their duty honestly and fairly to the public, the gas in Inverness could now be supplied at from 4s. 6d. to 5s.

Mr. Mitchell said he had no hand in fixing the rate of compensation, which the commissioners were to pay the shareholders of the old company. The bargain was fairly carried out by the commissioners in his absence, and a very good bargain it was for the town of Inverness Why, in Aberdeen and Dundee the price paid the old companies was £200 for what Inverness paid £150. The Corporation of Inverness actually got the works at a price of £180 less than what the old company paid their shareholders, the result being that he (Mr. Mitchell) got about £20 a year less now than what he got in dividends from the old company. He got that for his patriotism. So Bailie Macbean was quite in a mistake, for the price of the works had nothing to do with the present price of the gas, which would be regulated solely by the way in which the management and administration of the concern were conducted. They charged now 8s. 4d. per 1000 cubic feet; they had a waste of 29 per cent. of the manufacture; indeed, the whole thing was so bad that the provost had proposed to send for the gas manager of Aberdeen to advise them as to what they should do.

Mr. Macbean replied that the price paid, £150, was far too much for the works, which were rotten and useless.

Mr. Mitchell: Why did you give it?

Mr. Macbean was about to reply, when

Bailie Tulloch said Mr. Mitchell had all along been a member of the Works Committee, and was bound to attend the meetings to see about the alleged mismanagement. He distinctly denied that there had been any of the mismanagement that had been spoken to, and held that it was Mr. Mitchell's duty to have attended the meetings of the committee more frequently than he did. One member, who regularly absented himself from the meetings, was as responsible for mismanagement, if there was any, as the whole body.

After some remarks had been made by other members of the council,

The Provost briefly replied to Mr. Mitchell. He had no doubt as to the ability and efficiency of their present manager, Mr. Thomson; and the sole reason why Mr. Smith had been sent for was that they might have a report from him, as a man of great experience, on the works and their requirements, and in order that the public might be satisfied that the commissioners were desirous of doing everything within their power to cheapen the price of gas. As to the price in Aberdeen and Dundee, he reminded them that the gas revenue in Aberdeen was £43,000, whereas in Inverness it was only £7000—a circumstance which should also be taken into account in comparing the rates in the two towns.

The motion was then agreed to unanimously.

LAMBETH WATER-WORKS COMPANY.

The following is the Report of the Directors, presented at the Half-Yearly Meeting of Shareholders on the 27th ult.:—

The accounts for the half year ending the 30th day of September, 1877, duly certified by the auditor appointed by the Board of Trade, under the Metropolis Water Act, 1871, as well as by the company's auditors, accompany this report.

During the half year 1496 houses and other supplies have been laid on to the company's works at a rental of £3020 2s.

The capital account shows an expenditure for the half year of £9881 10s. 7d.; there remaining a credit balance on the 30th of September last of £13,958 5s. 1d., including the value of stocks in hand.

The bond and debenture debt has been reduced by £12,000 since the date of the last report, leaving £183,965 still due on the 30th of September. This sum has since been decreased by the payment on the 1st of November of additional bonds amounting to £26,800.

The total amount received during the half year on account of 4 per cent. debenture stock was £21,945. Under the authority granted by special resolution of the proprietors, the directors have created a further £25,000 of this stock, for which the proprietors were invited to subscribe by circular dated the 1st of October. Applications were received in reply for £92,030 from 157 proprietors, amongst whom the directors have allotted the stock in proportion to their holdings of shares. Payment is to be made in full on the 1st day of December next. Fresh issues will be made by the directors at such time and in such manner as may be necessary for the purposes of the company.

The surplus transferred from the revenue account, No. 3, to the dividend and interest account, No. 4, is £41,305 3s. After the payment of interest on the bond and debenture debt and debenture stock, there remains an available sum of £37,044 17s. 1d., out of which the directors recommend to the proprietors the distribution of a dividend for the half year ended the 30th of September, 1877, at the rate of 6½ per cent. per annum, less the income-tax, which will, it is estimated, amount to £34,630, leaving a balance of £2414 to be carried forward.

As regards the works, the engineer reports that the Norwood reservoir, which was practically completed at the date of the last half-yearly meeting, has been in use during five months, and, as it contains a very large volume of water at a high elevation, has proved of great utility in performing the upper services in and near that district, as well as in more remote parts at Forest Hill, Lower Sydenham, and the neighbourhood, and has thus relieved the excessive draught from the high level reservoirs at Rock Hill, which will now be capable of dealing more effectually with the highest services of the district. Moreover, the high-level pumping engines at Brixton are relieved to a corresponding extent, and great additional security in case of fire is afforded by the reservoir containing so large a body of water.

In order to improve the service of the district of South Norwood, &c., supplied from the Selhurst reservoir, a second 12-inch pumping-main, between Brixton and the reservoir, is being laid down, and will be finished in the course of a few weeks; and in connection with these mains a pipe is being laid to high ground near the reservoir, with the object of gaining about 40 feet of additional pressure above the high water of the reservoir, in order to improve the service near Norwood Junction and at Beckenham, &c.

An additional 12-inch main has also been laid down from the Streatham reservoirs, through Clapham Park, to Clapham Common, to improve the road-watering and other services in Nightingale Lane, Wandsworth Common, and generally in that part of the company's district.

These are all the new works, besides ordinary pipe extensions, which are at present being carried out. The reservoirs, pumping-engines, mains and works at the various stations are generally in a good state of repair and efficient working condition.

The directors have to announce to the proprietors that the head office of the company will be removed, about Lady-day next, to Brixton Hill, where the existing offices are being adapted to afford the necessary accommodation. Favourable results are anticipated from this concentration of the staff of the company.

Public attention has of late been directed to questions connected with the water supply of London generally. The directors have given their utmost care, and the proprietors have never hesitated to undertake the expense of any works required, to ensure an ample supply of pure water in the districts served by the Lambeth Water-Works. In any legislative or other measures affecting the company, that may be proposed, the directors will carefully watch over and endeavour to maintain the rights and interests of the proprietors.

The revenue account for the half year was as follows:—

Dr.—REVENUE ACCOUNT, FOR THE HALF YEAR TO SEPT. 30, 1877.

Maintenance.						
To Maintenance and repair of impounding and service reservoirs, filtering-beds, works, and pipes, &c., for obtaining and storing of water, including the cost of materials and labour	£626	15	9			
Maintenance and repair of mains, pipes, fittings, meters, and works connected with distribution of water, including the cost of materials, labour, and renewals	3,650	12	3			
Pumping and engine charges, including the cost of coals, wages, &c.	9,726	0	7			
Filtration, including the cost of materials and labour	627	9	9			
Salaries of engineer (or superintendent) and clerks, and wages of inspectors and turncocks	2,556	13	11			
Rents of houses and lands accrued due to date, and owing by the company	111	17	6			
Thames Conservancy	626	0	0			
Rates and taxes	3,827	7	9			
				£21,752	17	6
Management.						
Allowance to directors	£911	5	0			
Allowance to company's auditors	31	17	10			
Salaries of secretary, accountant, and office clerks.	844	15	0			
Superannuations of servants of the company	478	6	3			
Commission to collectors	2,100	3	11			
Stationery, printing, and general establishment charges	406	8	8			
Law and parliamentary expenses (opposition)	235	10	6			
Official auditor and water examiner	69	14	19			
				5,078	2	0
Dividend and interest account for transfer of profits				41,305	3	0
Balance carried to next account, to provide for losses				4,000	0	0
				£73,036	2	6

Cr.—REVENUE ACCOUNT.

By Balance brought from former account	£4,500	0	0			
Add surcharges on rental to Lady-day, 1877.	628	2	10			
	£5,128	2	10			
Less sums written off as losses, viz.—						
Empty houses, houses cut off, and bad debts	4,419	15	3			
				£708	7	7
Water-rents accrued to the date of this account				72,275	3	11
Rents of houses and lands accrued due to date, and owing to the company				40	7	6
Fees received for registration of shares, transfers, &c.				12	3	6
				£73,036	2	6

WARRINGTON GAS-WORKS PURCHASE.

Mr. Joseph Harrison, one of the opponents of the purchase by the Corporation of the undertaking of the Warrington Gas Company, has published, in a local journal, the following "Case," submitted by him for the opinion of Mr. Alexander Glen, as to the legality of the expenses incurred by the Corporation in canvassing and soliciting the ratepayers to vote for the purchase:

Case.

The Warrington Town Council, by a resolution unanimously passed on the July 31, 1876, resolved to purchase the undertaking called the Warrington Gaslight and Coke Company. At a meeting of the ratepayers duly convened by the mayor, under the provisions of the Borough Funds Act, 1872, and Local Government Act, 1858, to consider the action of the town council, a large majority of the ratepayers then assembled refused to sanction the resolution of the town council to purchase the gas-works, whereupon a ratepayer (being also a member of the council) demanded a poll. During the interval preceding the poll, certain members of the town council formed themselves into a committee (some of whom were large shareholders in the gas company) for the purpose of securing a majority of ratepayers in favour of the purchase, by employing two firms of solicitors (the Local Liberal and Conservative agents), a large body of paid canvassers, and others, and incurred other costs incidental thereto, in sending circulars and proxy forms broadcast to ratepayers, holding meetings, placarding the walls, distributing handbills, &c., amounting in all to several hundred pounds. The poll took place in due course, and resulted in a small majority in favour of the purchase. An Act of Parliament was subsequently obtained empowering the Warrington Town Council to purchase the said undertaking called the Warrington Gaslight and Coke Company, and which received the Royal Assent on June 11, 1877. When the town clerk came to submit the expenses incurred in obtaining the Act, and the expenses of taking the poll, and the costs incident thereto, to the taxing officer of the House of Commons, that official allowed the whole of them, without giving any intimation to the opposing ratepayers of the time and place of taxation; but it has since been discovered that the expenses incurred for canvassing and soliciting the votes, as above mentioned, had been included in the above accounts, which fact the town-clerk did not reveal to the taxing officer, and it is believed that it escaped the officer's notice. On the strength of this taxation the officer of the Local Government Board gave his certificate of allowance of all the expenses. The town council never authorized the expenditure of any money for canvassing or solicitation, beyond passing the following resolution on July 31, 1876:—"Resolved, that the General Purposes Committee are hereby instructed and authorized to take all necessary steps, either by parliamentary powers or otherwise, for carrying out the purchase of the gas-works." A print of the Act referred to is left herewith.

Counsel is requested to advise on the following points:—

1. Does the resolution before referred to authorize the town council to expend the ratepayers money in canvassing and soliciting the ratepayers to vote as detailed above, and if so, is such expenditure legal?

2. Is the taxation of the officer of the House of Commons taken in connection with the certificate of the officer of the Local Government Board final; or have the ratepayers of Warrington any, and what, remedy against the town council, or are there any, and what, means open to them of preventing their being saddled with the expenditure referred to?

Opinion.

1. I am of opinion that the resolution of July, 1876, did not justify the expenditure of any rates or funds of the corporation whatever, in canvassing or soliciting votes, and that the fact of such expenditure having been incurred would have been a valid ground of objection, either before the taxing-master of the House, or the Speaker on appeal from the taxing-master, under the 10 & 11 Vict., c. 68, sec. 9, or before the officer of the Local Government Board under the Borough Funds Act.

2. I am of opinion that the taxation of the costs and certificate, under the Borough Funds Act, taken together with the fact that the last clause of the Warrington Corporation Gas Act, 1877, which is very wide in its terms, has been passed and is in force, are sufficient to prevent the ratepayers from now re-opening the bill of costs, or of questioning the legality of any item comprised therein.

5, Elm Court, Temple, Nov., 1877. ALEX. GLEN.

BOLTON CORPORATION GAS-WORKS.

The additions to the Corporation Gas-Works in Lum Street are now rapidly approaching completion, and, as a portion of the new apparatus is already in operation, a brief description of the improvements, together with a statement as to their cost, may not be without interest. The additions comprise a new stack of 140 retorts; a purifying-house, 117 feet long, 55 feet broad, and 36 feet high; a block of rooms under one roof, consisting of a store-house, an exhauster-room, engine-house, and boiler-house, the length of this building being 90 feet, the breadth 60 feet, and the height 18 feet; and a lime-store, 90 feet long, 30 feet broad, and 33 feet high, with store-room for retorts under; together with an octagonal chimney, 90 feet in height. All the buildings are covered with an iron roof, except the lime-room, the roof of which is partly iron and partly wood, the object, of course, being here, as in the other portions of the building, to make them proof against fire. The Lum Street works now cover an area of about four acres; they are fitted with the most modern appliances for the manufacture of gas, and they will place Bolton in a position in this respect equal or superior to that of any other town in the country, of similar population. The extensions have been carried out with the view of replacing the old purifiers, condensers, and scrubbers, which have been in use at the works since their erection in the year 1853, and which are consequently somewhat primitive both in construction and appearance. Previous to the alterations, the retort-house at Lum Street accommodated only three stacks; each contained 100 retorts, the whole combined being capable of manufacturing 1,500,000 feet of gas per day; but, as already stated, a fourth stack has now been added, containing 140 retorts, and capable of producing 750,000 feet of gas per day. The aggregate number of retorts in the four stacks is therefore 440, and arrangements have been made whereby that number may be increased to 560, with a capacity for the manufacture of 3 million feet of gas every 24 hours. This fact has been kept in view in the making of the new condensing, scrubbing, and purifying appliances. The gas, as generated, contains tarry and ammoniacal vapours, and together with these impurities is conveyed from the retort-house in a pipe 24 inches in diameter to the new premises, which are contiguous to the old works, and first passed into two sets of new annular condensers for the purpose of extracting the tar. Each condenser consists of ten wrought-iron pipes, 36 inches in diameter and 20 feet in height, resting on a large cast-iron cistern containing about 2 feet depth of water. Inside these pipes is a smaller one 28 inches in diameter, open at the top and bottom, thus necessitating what is of considerable importance in condensing, a double exposure of gas to the air is passing through the condensers, both of which, by an arrangement of the valves, can be used at one and the same time, or separately, as occasion may require. The tar having by this process been extracted, it is carried into a large well underneath the condensers, to await its removal to the tanks of private purchasers. This well is 77 feet in length, 30 feet in breadth, and 21 feet in depth. It is divided into eleven compartments, each arch being four bricks in thickness, with inverts. The side walls are likewise arched so as to stand very great pressure; and, as showing the durability of the structure, it may be mentioned that it has been erected on 18 inches of puddle, with puddle back, and that it has absorbed nearly 400,000 bricks, cemented together with the best hydraulic mortar. From the condensers the gas, which still contains the ammonia, is next conveyed into the scrubbers, of which there are three placed triangularly. These scrubbers are cylindrical in form, each being 12 feet in diameter and 60 feet in height, and they are ascended by means of a spiral staircase of 110 steps placed in the centre of the scrubbers. Each scrubber contains 80 tons of coke placed on shelves, over which a stream of water is distributed, and this gravitates to the bottom, meeting on its way the gas, and cleansing it of ammoniacal liquor. The latter is then conveyed into the well mentioned above, where it separates from the tar, which, being the heavier body, falls to the bottom. The diameter of the foundation of each of the scrubbers is 14 feet. The foundations of one of them are carried to a depth of 21 feet, and those of the other two to a depth of 15 feet; and it is a noteworthy fact that when the cylinders are charged with coke and saturated with water, each of these foundations has to bear a weight equal to 280 tons. The gas is next passed through one of Beale's patent exhausters, made by Gwynne and Co., and worked by an engine of about 10-horse power, and from the exhauster it is passed through into the purifiers. Of these there are eight, each being 20 feet square, in two sets of four each, and, like the condensers, they are arranged so as to be used either separately or combined. These vessels are filled with 16,000 square feet of wood grids, covered with layers of lime about 2 or 2½ inches deep, for the purpose of purifying the gas from any sulphuretted hydrogen it may have carried with it. Subsequently, by means of a 24-inch pipe, the gas is conveyed to the gasholders at a pressure of 7 inches. The lime store, the roof of which is covered with fire-clay tiles, adjoins the purifying-house, and from these, through an aperture in the purifiers, the spent lime descends to a room underneath, whence it is carted away by the farmers and others who may purchase it. In connection with the works, a new elevated railway siding, about one-third of a mile in length, is being provided, and this will be a very great advantage, as it will enable the lime to be conveyed direct to the store, and also render it easy for the tar to be pumped from the well into the tanks sent by the distillers, as well as for its primary object of giving facilities for the unloading of cannel and coal. The new buildings are altogether of a most substantial description, and the lower part of the block, containing the store-room, exhauster-room, &c., is set with white enamelled brick, relieved with two bands enamelled blue. Fronting the works, and forming the boundary of the coke-store, a wall 4 feet thick and 20 feet high, supported by massive buttresses, has been built; and near to the weighing-machine house, which has been enlarged, is an imposing entrance gate, with rock-faced stone pillars 3 feet 3 inches square, surmounted by a couple of lamps of neat design.

The necessity for the extension was first reported upon by the gas engineer, Mr. Harrison Veevers, to a meeting of the Gas Committee, on the 7th of January, 1876. He pointed out that from the commencement of the previous November the whole of the retorts at both works had been in use, and as more gas had been required than could be made by working the retorts the ordinary six-hour charges, and with the ordinary heats of the furnaces, the coal had had to be worked off in a shorter time and with a more destructive temperature. But even with the extra quantity thus made, the supply had not been equal to the wants of the consumers, and, as a consequence, many of the larger ones had complained. The pecuniary loss to the department caused thereby Mr. Veevers estimated at very nearly £3000. To prevent a repetition of this unsatisfactory state of things he recommended the erection of a new retort-stack to contain 140 retorts, and the enlargement of the condensing, scrubbing, and purifying apparatus to a capacity for manipulating 3 million feet of gas per day. Plans of the extensions were prepared by the gas engineer, and these were subsequently submitted to Mr. Wm. King, of the Liverpool Gas-Works, who confirmed Mr. Veevers's opinion that arrangements should be made to render the works at Lum Street more perfect, and, with a few modifications, recommended the adoption of the extensions and alterations proposed by him. Very soon afterwards tenders were obtained, and the works as above described carried out.

As illustrative of the increase of consumption of gas in the borough during the past 20 years, we may state that in the year ending June, 1857, 120,718,000 feet of gas were manufactured. For the year ending the same period in 1867 the production was 204,454,000, or an increase of 70 per cent.; and for the year ending June, 1877, it was 420,836,000, or an increase in production over that of 1867 of 105 per cent. The greatest consumption of gas in one day has been 2,700,000 feet. At the present time there is in the borough storing capacity for 4 million feet, or a day and a half's consumption; and the works are now capable of manufacturing that quantity daily.

With reference to the cost of the extensions, the following was the estimate submitted to the Gas Committee by Mr. Veevers:—

Retort stack, pipes, hydraulics, and other ironwork,	£2,800
Exhauster engines, &c.	500
Additional boiler	500
Condensers	1,200
Scrubbers	3,500
Purifiers, valves, &c.	5,000
Purifying-house, including pillars to purifiers	4,500
Tar stores, engine-house, pipes, chimney, &c.	2,500
Total	£20,500

"Removal of cottages, extension of sidings, erection of boundary walls," added Mr. Veevers, "may bring this total up to £30,000." It is a matter of congratulation for the committee that the plans and specifications have been so well matured that the contracts will not be exceeded by more than 1½ per cent.

The work has been carried out under the active personal superintendence of Mr. Veevers, who is deserving of credit for the way in which it has been accomplished.—*Bolton Chronicle.*

STONE'S WATER-WASTE PREVENTER.

Messrs. Stone and Co., of Deptford, have recently patented a Waste-Preventer Valve or Tap, suitable for either high or low pressures, which is illustrated in the accompanying engravings.

Fig. 1 is a sectional elevation of one form of the waste-preventer valve or tap. It consists of a brass cylinder containing a hollow float, the upper part of which forms a valve-spindle, with a valve on the top, which controls the communication between the inlet and the outlet. The valve-spindle slides freely up and down in a guide, which is arranged so as to allow a small quantity of water gradually to pass between it and the valve-spindle into the cylinder. Below the float is a cupped leather piston, arranged so that in its upward traverse it readily allows the water to pass between it and the inside of cylinder, but in its descent the pressure of water expands it, causing it to fit the cylinder closely, so that it forces the water beneath it out of the passage in the lower part of the cylinder. Its action is as follows:—When the closet lever is raised, it causes the cupped leather piston to descend, displacing the water contained in the cylinder, and causing the float, and with it the controlling valve, to drop, thus opening up a free communication between the inlet and the outlet, and allowing the water to run. This, if the closet lever be held up, it will continue to do, until the gradual accumulation of water, passing between the valve-spindle and the guide into the cylinder, causes the float with the valve attached slowly to rise and close the outlet, which it will do without shock or tremor.

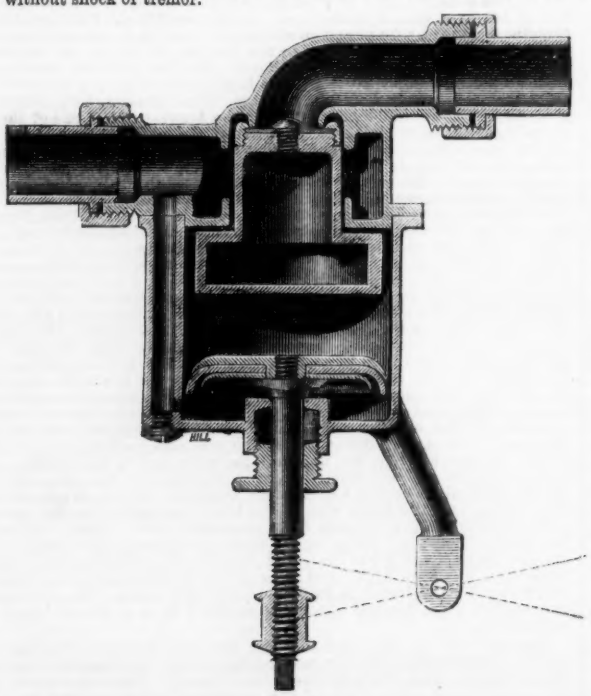


Fig. 1.

The maximum quantity of water allowed to flow at one operation is regulated by the traverse of the cupped leather piston, and this is governed to the greatest nicety by simply raising or lowering the regulating nut on the piston-rod at the bottom of the apparatus, which any plumber can readily do. The valve can, however, be shut off at any time in the same way as an ordinary supply-valve, by simply letting go the closet lever, when the cupped leather piston will press against the bottom of the float, and so force the valve on to its seat, and hold it there; thus rendering the valve doubly secure against leakage, being kept sound both by the pressure of the water and also by the weighted lever above referred to.

Fig. 2 is a sectional elevation of another form of the valve, which is fitted with an arrangement for obtaining an after-flush, for trapping the closet pan after the closet lever has been let go, and is specially adapted for valve and pan closets. This apparatus is precisely similar to fig. 1, but with the addition of the regulating arrangement for trapping the closet pan. This consists of an additional cupped leather piston, fixed on the same spindle as the other, but arranged the reverse way, so as to allow

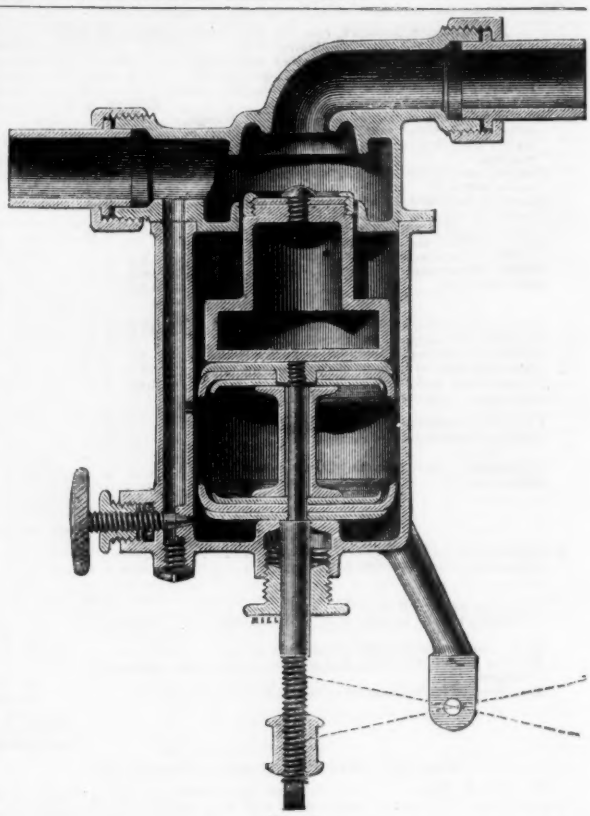


Fig. 2.

the water readily to pass it in its downward passage, whilst in its ascent, the pressure of the water expands it, causing it to fit the cylinder closely. The small regulating valve, opposite the passage into the bottom of the cylinder, is arranged so as only to allow the water *gradually* to flow past it into the cylinder. By this means, when the closet lever is raised and let go again, the pistons (both being connected to the same rod) can only rise as the water is slowly admitted past the small regulating-valve to the under side of the lower piston, which is thus caused gradually to rise, and so shut off the valve, the time occupied in its doing so being governed to the greatest nicety by means of the regulating-valve before referred to.

This arrangement is also peculiarly adapted for high-pressure services, as, by ensuring the gradual closing of the valve under all circumstances, it prevents concussion in the pipes.

LIGHTING BY ELECTRICITY.

In recording the progress made in the new method of lighting, the last number of the *Journal des Usines à Gaz* states that the two lamps ornamenting the front of the offices of the Paris *Figaro*, in the Rue Druot, were lighted for two evenings by means of M. Jablochkoff's electric "candles." The trial was of very short duration, and it is believed that the new light was abandoned on account of the motive power, required for driving the Alliance machines, having to be obtained from the engines employed in the establishment, and just at a time when all the available force was required for printing the paper.

Attention is also called to the fact that the shares of the Paris Gas Company have recovered in price, and this is thought to be not altogether unconnected with the limited success which has attended the lighting of the *façade* of the Opera House by electricity. In the *loggia*, where the electric light was perfectly successful, it was only used occasionally, probably owing to an insufficiency of motive power.

The partisans of electric lighting have to be cautioned against over-zealous friends. In recent numbers of the *Revue Nouvelle de l'Industrie et des Travaux Publics*, the editor, after having panegyrized the new mode of lighting, deals what he supposes will be a crushing blow to gas. He accuses it of causing the "vital degradation and moral stultification of our species." He does not say whether he has tried the experiment upon himself. "Acute asphyxia by *carbonic acid*, in its various phases," he remarks, "has for a long time been known to everybody; but what is scarcely suspected is chronic asphyxia by *gas*, examples of which multiply under our very eyes without the public mind taking heed of them, and without Science herself being roused!" It is useless to discuss such statements as these; ample justice is done by their reproduction.

In a communication made to the meeting of the German Association of the Gas Industry, at Leipzig, M. Oechelhäusser entered minutely into the subject of the electric light and its probable competition with gas. He remarked that during the last few years the electric light had emerged from the experimental state and come into practical use. This result was to be attributed principally to improvements in the lamps and magneto and dynamo-electric machines, which had been effected principally in Paris, where the electric light had lately been competing with gas. There was, no doubt, a great future in store for this mode of lighting, chiefly for lighthouses, dockyards, manufactories, goods depôts, railway-stations, squares, public gardens, open air resorts, and generally for all localities where a general and continuous, but not necessarily an equally distributed light was required, and where it was used for only a few hours in the evening. But such were only a few of the uses to which gas could be applied; the actual competition would commence when electricity was applied to interior illumination, it being understood that for some time yet the public lighting must not be taken into account, unless some means were discovered of dividing the light and reducing the cost of the conduits between the generating apparatus and the public lamps.

The electric light was the result of the transformation of motive power first into electricity and finally into light. The motive power was employed in turning the magneto-electric machine 1800 revolutions per minute, and the electric current thus produced caused light to appear in the shape of a

permanent spark between two cones of carbon, kept at an equal distance one from the other by the mechanism of the regulator, and heated the points of these cones to an intense white heat. The cost of the production of the electric light was, therefore, not to be compared with that of gas. The carbon cones which were burnt away must be regarded as the only raw material employed, and to this must be added the coal or gas required for the engine employed in working the magneto-electric machine, and the cost of supervision and keeping the apparatus in repair.

There were other reasons, however, which made a comparison of electric with gas lighting very difficult. This was due to the circumstance that the electric light was produced from two single focuses of great luminous intensity, while gas light was supplied from systematically distributed luminous jets, which singly had but a limited lighting power. The law that the illuminating power diminishes in proportion to the square of the distance, made it absurd to attempt to compare the luminous effect produced by a Gramme machine with the total lighting power of isolated gas-jets, or to establish a comparison between an electric light of 1000-candle power and 100 gas-burners, each of 10-candle power.

But even with this law no certain basis of comparison could be arrived at, seeing that in each case, taken by itself, everything depended upon the position of the light with regard to the object lighted. If, for instance, a gas-jet were placed perpendicularly at a height of about 3 feet above a table, the light produced could not be obtained from an electric light placed at 25 feet above the same table, unless it had an illuminating power equal to 64 times that of the gas. If the electric light were placed at the side of the table, and at a height of 10 feet, an illuminating power equal to 171 times that of the gas-jet, and at a height of 6 feet 6 inches, 256 times that power would be required to produce upon the table the same amount of light as that given by the gas-jet placed 3 feet above it. Taking into consideration, then, the facility afforded by the locality for fixing the light, it could be ascertained whether the electric light would replace a double number of gas-jets, and if its employment were practicable. Persons interested in electric lighting give 16 feet as the normal height at which the light should be fixed, and regard 13 feet—the height usually adopted in manufactories—as the practical limit. When all points had been carefully considered, it was impossible to find an exact and general formula to express the real value of the electric light in relation to gas. One thing, however, was certain—namely, that the superabundant luminosity in the immediate vicinity of the electric light was, economically speaking, valueless, and it should be considered whether the various parts of a workshop received the same amount of light with electricity as with gas-jets systematically arranged. As yet it was upon this unsound basis that all the calculations made by the partisans of the electric light were founded, and all its pretented pecuniary advantages over gas lighting demonstrated. The cost of an electric lamp and that of 100, 150, and even 250 gas lights were put down, and from these figures it was assumed that lighting by gas cost five and even ten times as much as lighting by electricity. In order to arrive at approximate figures, the actual number of gas lights replaced by an electric light, in an establishment where that system of lighting was adopted, ought certainly to be statistically demonstrated.

The expenses incurred in fitting up the electric light for the goods station at La Chapelle were given by the partisans of the new system as follows:—

Cost of Production per Hour.

	Centimes.	Sterling.
Consumption of carbon cones	20	2·0d.
Maintenance and supervision	30	3·0d.
Consumption of coal by steam-engine. 2½ horse power, 2·5 kilos. of coal per horse power per hour, or for each machine 6·5 kilos., at 1s. per 50 kilos. (1 cwt.)	13	1·3d.
	63	6·2d.

Interest and Sinking-Fund on Expenses of First Establishment.

	Francs.	Sterling.
One Gramme machine (Paris price)	1500	£60
One Serrin lamp	450	18
Carriage, fixing, lanterns, conducting wires, &c.	1500	60
Steam-engine (proportionate charge for power required)	2500	100
	5950	£238

The interest on this amount is taken at 5 per cent., and the sinking-fund at 4 per cent., when the light is used for about 500 hours per annum; at 6 per cent. for 4000 hours. An uniform rate of 10 per cent. is generally taken in France.

The cost for one hour of a Gramme machine and a Serrin lamp would be—

	For 500 Hours Lighting.	For 4000 Hours Lighting.
Cost of apparatus	6·25d.	6·25d.
Interest and sinking-fund	10·70d.	1·63d.
	16·95d.	7·88d.

The above figures will show the great difference in the cost of the electric light according to the number of hours burning—a difference that does not exist in the case of gas or any other mode of lighting It will thus be seen why the former light is only recommended in cases where it can be employed all through the night.

If in comparing electricity with gas lighting absurd comparisons are made, by interested parties, as to the cost of apparatus, it is incumbent upon the other side to find out what is the actual extent of space lighted by a Gramme machine, and the number of gas-burners actually replaced by it. And here the question is not one of approximate figures, each industry requiring a different intensity of light; nor must the greater or less elevation of the electric lanp, and the shape and extent of the area to be lighted, be omitted from consideration.

From calculations made in eleven cases where the electric light had been employed in manufactories of various kinds in France and Germany, M. Oechelhäusser found that for a superficial area of about 3500 square feet one Gramme machine and one Serrin lamp were sufficient. The smallest surface lighted was about 1550 square feet and the largest 5200 square feet. The point of elevation of the light ranged from 10 to 20 feet, and in two cases the rays of light were reflected. The number of gas-jets replaced could rarely be correctly ascertained, but in France the highest number found was 30 Carcel burners, consuming 3·7 cubic feet of gas per hour. In the goods depôt at La Chapelle, where three Gramme machines were in operation, one machine replaced nine burners, each consuming 4·2 cubic feet; it was estimated, however, that 21 burners were necessary to supply the amount of light given by the electric lamps. At the Northern Railway Station it was estimated that one Gramme machine would furnish the amount of light given by 24 burners, each consuming 3·7 cubic feet of gas. If, therefore, one Gramme machine is calculated upon to replace 33 Carcel burners in the lighting of a manufactory, the experiments made up to the present time go to prove that this is not the minimum power of the light, but rather its utmost limit. In this case one gas-burner would have about 160 square feet of surface to light—a mean generally exceeded in large establishments.

The figures are quite different in the case of market-places, courtyards, warehouses, &c. In six cases the mean amount of surface lighted was about 10,500 square feet, or three times the extent lighted in manufactories.

In such a case, where a general rather than an evenly distributed light was required, the electric light might certainly be very advantageously employed; equally so for open air illumination in the evening, where some 22,000 square feet of surface might be lighted with one lamp.

Taking, therefore, the cost of a Gramme machine at about 17d. per hour for 500 hours lighting, and 8d. per hour for 4000 hours, it would give a cost, for the 25 gas-burners replaced, of 0·67d. per burner per hour in the former case, and 0·32d. in the latter.

M. Oechelhäusser then enters into a number of calculations as to the relative cost of the two lights with the price of gas ranging from 4s. 6d. to 5s. 10d. per 1000 cubic feet, and a burner consuming 5 feet per hour, showing that the cost in the former case would be about 7·5d. per hour, and 10d. in the latter, to which must be added a small sum for interest and sinking-fund; making altogther about 8·5d. and 11d. per hour for 500 hours, and 7·5d. and 10d. per hour for 4000 hours lighting.

Comparing these amounts with the cost of the electric light, which was found to be per Gramme machine, for 500 hours, 17d. per hour, and for 4000 hours about 8d. per hour, it would be found gas would have to cost at the rate of about 11s. per 1000 in the former case and 5s. per 1000 in the latter to equal the cost of the electric light.

In large works, where several Gramme machines were employed, the cost of maintenance and supervision was reduced; with 4000 hours lighting the cost of an electric light equal to one gas-burner would be reduced to about 4s. 6d. per 1000 cubic feet, and this was the lowest equivalent cost which, in the present condition of electric lighting on a large scale, during the entire night and under good conditions, could be placed in comparison with that of gas lighting. For half the night the equivalent cost would be about 5s. per 1000 cubic feet. If the Gramme machines were actuated by a separate engine, the cost would be a trifle more to allow for interest and sinking-fund.

It followed, M. Oechelhäusser said, from the above details—

1. That for ordinary lighting in the evening only, for about 500 hours per annum, the electric light was considerably dearer than gas, under all conditions.

2. That an approximate equality of price with that of gas was not arrived at until the lighting was continued into the night, or for 2000 hours per annum.

3. That there could be no question of real pecuniary advantage, and only an inconsiderable one under the most favourable conditions, unless the electric light were continued all night, or for 4000 hours per annum.

If the various complications attending the application of the electric light—its complete dependence on the working hours and rapidity of the motive power employed in its production—were considered side by side with the simplicity and ready applicability of gas lighting, it would be seen how groundless were the fears entertained in some quarters for the future of the latter system of illumination. The electric light would, undoubtedly, soon be employed, in some cases, for interior illumination; but, looking at the position in which it now stood, there was no ground for fear that it would enter into immediate and serious competition with gas. This opinion was shared by all those papers in Paris which dealt with the gas question. The electric light would only affect to a trifling extent the annual increase in consumption which has taken place up to now, and this would be compensated for by the extra quantity of gas consumed by gas-engines.

No very serious competition with gas need be expected until the electric light could be subdivided with the same facility as gas, and it was to this end that M. Jablochkoff's most recent efforts were directed. The experiments make in the *Magasins du Louvre*, with a new and very simple kind of lamp, showed that a certain divisibility of the light was attainable; but this result was only arrived at with the usual primary outlay, heavier working expenses, and a greater loss of light, and had not yet been found to be superior to the Gramme machine supplying one Serrin lamp only. As far as M. Jablochkoff's researches in other directions in connection with this matter were concerned, no result had been attained to lead to the hope that he would be more successful than his predecessors, who for the past 30 years had turned their attention to the solution of the problem. The possibility of arriving at such solution, however, must not be ignored. Dr. Werner Siemens thought he had nearly discovered it. In an article in the *Elberfeld* he said: "The strong concentration of the electric light is rather disadvantageous for the uniform lighting of large areas, and for most of the purposes for which gas is employed. It is possible that progressive science will in time overcome this defect of the electric light. Persons are already engaged in the attempt, and hope to succeed; but, in the meantime, we ought to set aside all idea of a general substitution of the electric light for gas."

The field of operations of the lighting industry was so vast, and with the progress of civilization would be so greatly enlarged, that, in the general interest, we should cheerfully hail the invention of every new illuminating agent, rather than allow ourselves to be overcome by groundless fears. Whenever a new lighting material had appeared, short-sighted people had trembled for the existence of its predecessor, and thought there would be a superabundance of light. Yet each occupied its proper place in the great sphere of the lighting industry. The electric light, in its turn, would enter this vast arena, not, however, to engage in deadly conflict, but to extend and complete its boundaries.

Local Government Board Inquiries.—On the 14th ult., Mr. J. T. Harrison, C.E., one of the inspectors of the Local Government Board, held an inquiry at Mountsorrel, Leicestershire, relative to an application made by the Barrow-on-Soar Rural Sanitary Authority for sanction to borrow £2000 for works of drainage, according to plans prepared by Mr. Hodson, C.E., of Loughborough. The sewage is to be disposed of by means of irrigation. On the 16th ult., Mr. R. Morgan held an inquiry at Southampton as to an application made by the town council to the board for sanction to borrow £87,000, for paving, sewering, lighting, and otherwise improving certain streets, for works of water supply, for providing baths, slaughter-houses, fire-escape stations, and a hospital, and for repaying certain moneys borrowed on security of old Water-Works and Improvement Commissioners Bonds. Mr. P. Cox held an inquiry at Normanton on the 22nd ult., on the application of the local board to borrow £8500, for water supply and sewerage purposes. Mr. J. T. Harrison held an inquiry at Pontefract on the 23rd ult., upon a petition forwarded to the Local Government Board by Messrs. Vaux and Co., of Dewsbury, to the effect that the Pontefract Corporation had failed to provide proper drainage to their property, situate at Grove Town, south of the borough, and to inquire into the default of the corporation in not having carried out the recommendations of the inspector at the inquiry in 1872, as to a proper system of drainage being carried out for the town. After hearing evidence, the inspector commented upon the neglect of duty by the corporation, and said he should report to the Local Government Board, and they might immediately apply for a *mandamus*.

WILSON'S IMPROVEMENTS IN HYDRAULIC MAINS AND AUTOMATIC DIP-PIPES.

In the annexed engravings are illustrated certain improvements in the hydraulic main, and the dip-pipes connected therewith, the invention of Mr. W. P. Wilson, of Peckham. The object sought to be obtained by this arrangement of apparatus is the provision of means whereby the tar may be carried away almost as quickly as it is formed, so preventing it from becoming thick or hard, and to relieve the retorts from all unnecessary pressure when gas is being produced.

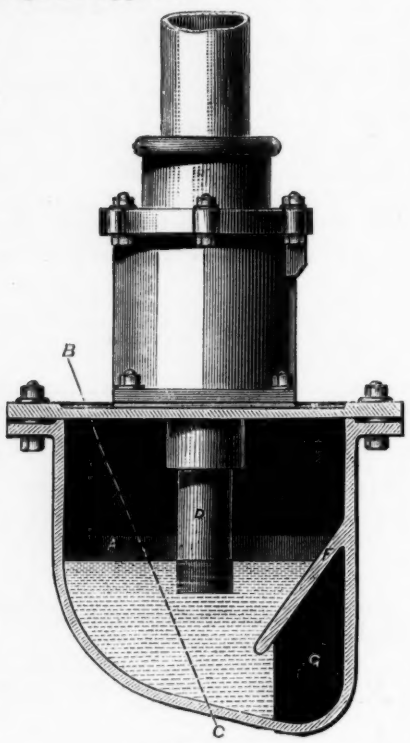


FIG. 1.

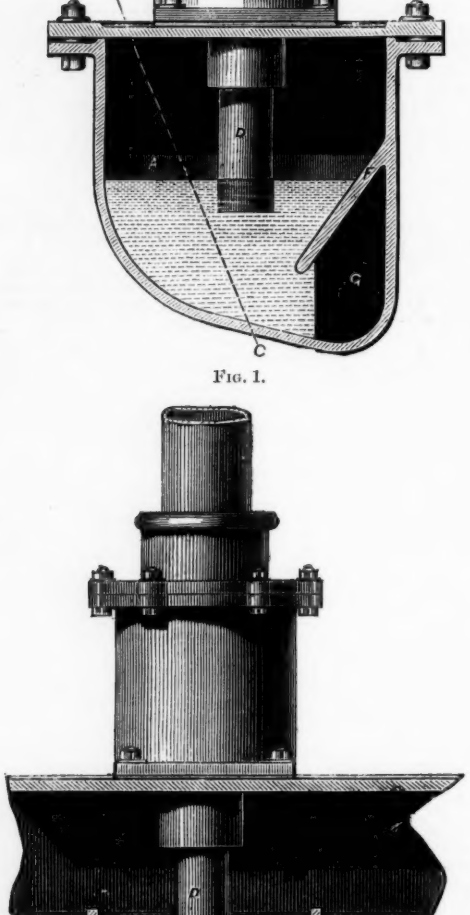


FIG. 2.

Fig. 1 is a cross section showing the improvements in the hydraulic main, and the automatic dip-pipe attached in position.

Fig. 2 is a longitudinal section of the hydraulic main through the line B C, fig. 1.

Fig. 3 is an enlarged vertical section of the automatic dip-pipe; and

Fig. 4 is a plan of the automatic dip-pipe with the cover removed.

The improvements in the hydraulic main consist in inserting transverse division-plates, A (fig. 1), and A, A (fig. 2), which is a part section through B C of fig. 1, which rise about 3 inches above the level of the liquid, and are placed one between each dip-pipe, D. A longitudinal partition, F, extending the whole length of the hydraulic main, is joined thereto at about the level of the liquid, and extending downwards in an oblique direction to within about 2 inches from the bottom, so as to form a conduit, G, for conveying away the tar or other liquid.

The improvements in the dip-pipes consist in an arrangement whereby the pressure of the gas in the retorts acts automatically in unsealing the dip-pipe, and the absence of pressure causes the dip-pipe to be sealed.

In this arrangement the dip-pipe, D, fig. 3, is constructed with an annular cup or lute, H, fixed at about the centre of its length, and of a sufficient depth to withstand a back pressure of from 6 to 8 inches. The upper part of the dip-pipe is increased in diameter, and forms a hopper-top, as at I, and immediately under it is fixed, on opposite sides, two snugs, J, by which it is suspended by a forked lever, K, balanced by another forked lever, L, that carries or suspends an annular holder or bell, M, the inner ring of which dips into the cup or lute fixed on the outside of the dip-pipe.

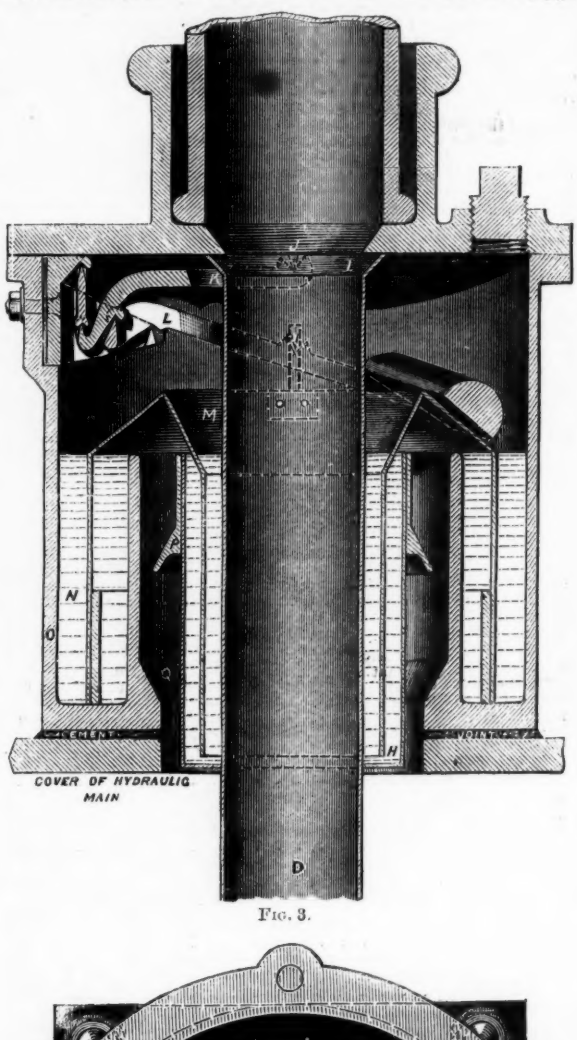


FIG. 3.

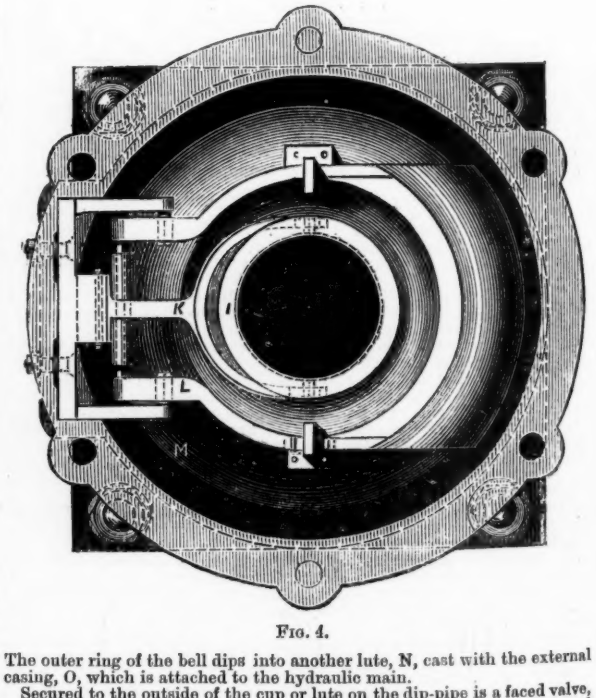


FIG. 4.

The outer ring of the bell dips into another lute, N, cast with the external casing, O, which is attached to the hydraulic main.

Secured to the outside of the cup or lute on the dip-pipe is a faced valve, P, which fits into a seat, Q, formed on the inner surface of the internal ring of the cup forming part of the external casing.

The suspending levers are constructed so that the valve, P, does not descend to its seat, Q, under the ordinary working pressure, but only when an extreme pressure occurs in the hydraulic main, thus preventing the gas in the hydraulic main passing through the lutes back into the retorts when the back pressure is likely to exceed their seal.

The annular bell, M, and the dip-pipe, D, being suspended by the balanced levers, as shown in fig. 3, and thus in a state of equilibrium, and the area of the bell being about eight times greater than that of the dip-pipe, the moment that the pressure of the gas from the retorts is equal to the pressure in the hydraulic main (which pressure in the hydraulic main need never exceed 1-10th of an inch), the bell descends, and the dip-pipe rises out of the liquor in the hydraulic main, thus permitting a free passage for the gas without further pressure on the retort than that existing in the hydraulic main. When the retort has ceased to make gas, or the lid is opened, there being no pressure on the top of the bell, the pressure in the hydraulic main acts on the under-side of the bell, causing it to rise, and the dip-pipe to descend into the liquor in the hydraulic main, thus effectually sealing the mouth of the dip-pipe.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

During the past week there have been no trade changes of any particular importance, with the exception of the steps which have been taken by the Sheepbridge Coal and Iron Company for effecting a reduction in the number of their workmen, and the dispute which has arisen between William Cooke and Co. and their puddlers. In both instances the action taken by the employers serves to show how extremely dull the ordinary iron trade is, and how desirable it is that the production should in all respects be more strictly limited. The market is everywhere overstocked, particularly with pig iron, so that it would appear to be absolutely necessary to blow out more furnaces before any revival can be hoped for. This is likely to be done by more than one firm in this neighbourhood, and some check is also likely to be placed on other branches. The ordinary pig iron trade is very quiet—in fact, common pig can be had at what must be considered purely nominal figures, and even good reputable brands are negotiable on very easy terms. It is not now likely that many sales of any note will be effected this month, as all classes of manufacturers desire to carry as little stock as possible over into the accounts of the new year.

In the coal market there is a fairly steady amount of business, but not that activity which generally characterizes the incoming of December. A few kinds of house coals are slightly dearer, but the general market is unchanged, steam coal, gas coal, and engine fuel being only in quiet request.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

A few inquiries for gas-making coals have been cropping up in the market; but, whether they are simply feelers as to prices, it is difficult to say, and it is equally difficult to ascertain the prices sellers would really take, as, although the great bulk of the requirements of consumers has already been secured by contract, there is still a great deal of gas-making coal unplaced in this district, and colliery proprietors themselves are uncertain what price to quote, owing to the keen competition for even really good orders for any class of fuel, except some of the best descriptions of house coal, that comes into the market. In some quarters best house coal is now rather scarce, with rather an upward tendency in price; but second qualities of round coal, whether for house fire or any other purpose, are plentiful in the market, and do not more than maintain the late low rates. Common coal for forge purposes is very difficult to move, and prices are weak. Engine classes of fuel continue a drug in the market, only the better sorts meeting with anything like a ready sale, inferior descriptions of burgy and slack being almost unsaleable at present, and accumulating largely in stock. The average pit prices may be given about as under:—Best Arley, 10s. to 11s. per ton; common ditto, 8s to 9s.; Pemberton four-feet, 8s. to 8s. 6d.; common house coal, 6s. 6d. to 7s.; forge coal, 5s. 6d. to 6s.; burgy, 4s. 9d. to 5s. 3d; and slack, 2s. 6d. to 4s. per ton, according to quality.

The shipping trade continues in a very depressed condition, with very low prices still ruling; common coal delivered at the high level, Liverpool, being offered at less than 7s. per ton, and good Lancashire steam coal alongside at less than 9s. per ton.

In the iron trade of this district there is still very little doing. North country makers of pig iron who have advanced their prices at Middlesbrough 1s. per ton, are unable to obtain the higher rates in this district, as consumers can cover their small requirement from merchants at the old prices. Lancashire makers are securing very little business, but they remain firm at late rates. Finished iron is without material change, local bars delivered into the Manchester district being still quoted at £6 7s. 6d. to £6 10s. per ton; but the extremely low figures at which outside iron is offered in this district render it almost impossible to secure any business of a remunerative character.

A fair order for locomotives is reported to have been just secured by one of the Manchester engineering firms, and other important railway work is looked forward to; but works, as a rule, all through this district, are extremely slack.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

During the past fortnight, the demand for better qualities of gas coals has been fully maintained. The rates are unchanged, and range from 8s. to 7s. per ton. Gas coals are still being sent by steamers to the United States of America, at a rate of freight quite as low as what is paid to boats to take a similar class of coal to London. It is between 4s. and 5s. per ton. A fair business is done with second-class gas coals; but they are closely troden upon by the manufacturing collieries, which, in some instances, produce an inferior kind of gas coals. They have, therefore, quite enough to do to hold their own. The trade in second-class gas coals is not dull, but it can hardly be called "seasonable." House coals of the better qualities have risen about 1s. per ton, and the shipments of gas and house coals have been fully an average. Great depression exists in the steam coal trade, and there are rumours of more pits being laid in. The Northumberland Coal Owners' Association have given notice of a reduction of 12½ per cent. on wages. Shipments of steam coal are very poor. Purchasers of steam coal for immediate shipment are liberally treated with. The price of best steam coal is little more than 10s. per ton.

The coasting freights are quiet. They may be quoted as 4s. 6d. per ton London and 4s. 9d. Rochester, and £6 10s. per keel Hamburg, for steamers, and 6s. 3d. to 6s. 6d. small sailing vessels to load gas coals for the gas-works below bridge in London river. A quiet trade is doing with France. Most of the coals being carried to that country from the North are for the gas-works of the leading French cities. Freights to Havre are 6s. 3d. per ton, and for gas coals by steamers to Dublin 7s. 3d. to 7s. 6d., and Cork 7s. 3d. and 7s. 6d. per ton. There is an ordinarily fair supply of steam and sailing tonnage coastwise. Rates are unchanged. The coke trade to Spain is doing tolerably well, and cargoes of iron are being despatched to the Continent from the Tyne and neighbouring ports.

The import trade of the North of England is pretty good. The best demand is for pit timber. There is not much lead or ore coming from Spain or Africa.

The chemical market continues exceedingly dull, and there is no change in prices. The general manufacturing trade, which includes iron and chemicals, has not been so depressed for a considerable number of years. There is very little business doing, and what there is the makers say is not done at a profit. The disturbed state of affairs in France is having a bad effect upon business in this district.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

A few days ago the Burghs Gas Supply (Scotland) Act was adopted by the Town Council of Peterhead. No information from the gas company was laid before the meeting at which the resolution was come to; indeed, it was stated that a number of communications had been sent to the company asking for information, to none of which had any reply been received. The price of gas in Peterhead is 8s. per 1000 cubic feet, a higher price, it was stated at the meeting, than is charged in any other town of the same size in Scotland.

On Monday, Nov. 26, the Town Council of Burntisland, as required by the Burghs Gas Supply Act, held a special meeting, and unanimously confirmed their resolution to adopt that measure. Thereafter the town-clerk was instructed to open negotiations with the North British Railway Company for the purchase of the existing gas-works. For many years the railway company maintained a large staff of workmen in the engine and waggon departments at Burntisland, and hence the reason for the establishment of a gas-works in the town. During the last few years, however, the local railway establishment has been broken up, and consequently the reason for maintaining the local gas supply on the same footing no longer exists.

The large new gasholder which has been in course of construction during the last eight or nine months at the Paisley Corporation Gas-Works was completed last Thursday afternoon. It is expected to be ready for use in a few days.

Progress is being made with the public lighting of a number of villages and small burghs throughout Scotland that have hitherto been in a condition of "outer darkness" during the winter season. One example is an outlying portion of the new burgh of Cambuslang, a few miles to the east of Glasgow. At a meeting of the householders held last week, it was agreed to erect 90 street-lamps, at a cost of £2 8s. per lamp. Out of 90 feuars in the district in question, there were only three objectors to the measure. A large portion of non-burghal Pollokshields, which is also in the outskirts of Glasgow, is being supplied with street-lamps, from a fund to be raised by voluntary assessment. In the mining village of Crossgates, Fifeshire, funds for the lighting of the streets are to be raised by a public concert. The town of East Kilbride, in Lanarkshire, is still without any arrangements for the public lighting of the streets, notwithstanding that it can boast of gas-works. It is confidently expected that something will be done in that direction soon.

A feeling is arising in Airdrie that the gas supply undertaking should be in the hands of the town council. In the meantime, there are complaints that the charge is 4s. 2d. per 1000 cubic feet, while at Coatbridge, only a mile or two distant, the price is only 3s. 9d., and it is alleged that the quality, as well as the price, is in favour of Coatbridge.

Whatever may be the cause, there are certainly loud complaints just now regarding the quality of the gas that is being supplied in one of the eastern districts of Glasgow, and it is not unlikely that they may be publicly noticed by the Gas Commissioners at the next meeting of the town council. However, I may mention that the latest returns from Dr. Wallace, the official gas examiner for the city, show that in no case was the minimum illuminating power (for the week ending the 24th of November) under 26·17 candles.

The Thurso Police Commissioners have just imposed an assessment of 2s. 6d. in the pound for water, as against 1s. 6d. in the pound last year.

Up till the 19th ult. the revenue received by the Glasgow Corporation Water Commissioners for the year 1877-78 amounted to £42,292 10s. 6d., compared with £44,055 10s., being a decrease of £1762 19s. 6d. At the same date the quantity of water in store was as follows:—In lochs, 127 days supply; in Mugdock reservoir, 17 days supply; in Gorbals reservoirs, 147 days supply; and that the quantity sent into the city and suburbs during the previous fortnight averaged 33,640,000 gallons per day.

The action by Messrs. Edington and others against the Dundee Water Commissioners has now been finally settled, the pursuers having agreed to accept the judgment of the Lord Ordinary (Lord Curriehill) as adjusted.

It is expected that operations will be commenced in January next for the introduction of a gravitation water supply into Kilmalcolm, which is a pleasant and popular residential village on an elevated district between Glasgow and Greenock.

The Perth Water Commissioners are proposing to borrow the sum of £35,000, at 4½ per cent. interest, for the purpose of carrying out their new water supply scheme.

The new sewerage works for the town of Fraserburgh, which have been completed at a cost of £4000, were formally inspected last week.

Prosecutions have lately been instituted in Glasgow, under the Public Health Acts, against house proprietors who had failed to provide water for domestic consumption to their tenants, unless from the cisterns connected with water-closets. In the meantime, no further action will be taken until time is given for making the necessary alterations in the water service-pipes.

A good business was done in the Glasgow pig iron market during the past week, and there was an advance of 4d. per ton in the price over the week. The market closed on Friday afternoon with sellers at 52s. 4d. prompt cash, and 52s. 7d. one month, buyers 1d. per ton less. There are now 88 blast furnaces in operation in Scotland; two have been blown out at the Portland Iron-Works, and one has been blown in at Dalmellington—both in Ayrshire. The malleable iron trade is in a very bad way.

The coal market is at present in an exceptionally depressed condition. Orders are scarce, and business in all descriptions is very dull. Prices, however, remain unchanged.

EXTRAORDINARY ACCIDENT.—On Friday morning, the 2nd of November, a traction engine, weighing 8 tons, belonging to Lord Aveland, of Normanton Park, was passing down New Street, on its way to the Oakham railway station, with two ponderous trucks to fetch corn, when, in passing over a man-hole of the new sewerage, the planks, not being sufficiently strong, gave way, and the engine was precipitated into the sewer. Men were at once set to work to extricate the same, and had nearly succeeded when, in trying to start it, it again backed into the sewer, and broke the main gas-pipe. The gas, escaping with great force, came into contact with the fire of the engine, and immediately ignited, the flame rising to an immense height, which greatly alarmed the people who had congregated. Information was at once sent to the gas-works, the manager having no other alternative than to immediately cut off the supply, thereby throwing the town into darkness. Business was partially suspended, the tradesmen having either to burn candles or close their establishments. After a deal of labour with jacks, &c., the engine was at last extricated about nine p.m., and proceeded to the station amid the cheers of the on-lookers. —*Grantham Journal.*

REDUCTIONS IN THE PRICE OF GAS.—The Dover Gas Company announce that the price of all gas supplied from and after the quarter commencing Jan. 1, 1878, will be 4s. per 1000 feet (being a reduction of 3d.), subject to a discount of 3d. per 1000 for prompt payment, making the net price 3s. 9d. per 1000 feet. The Elsecar, Wentworth, and Hoyland Gas Company announce a reduction of 5d., to take effect at the same date, with a discount at the same rate for prompt payment.

TROWBRIDGE WATER COMPANY.—An extraordinary general meeting of shareholders was held at the company's office, Cambridge, on Wednesday, the 21st ult., for the purpose of considering a proposed application to Parliament for powers to extend the company's limits of supply to Westbury, Bradford, and Melksham, Wilts, and for other purposes. S. Peed, Esq., chairman, presided, and explained that the object of the meeting was to give the shareholders an opportunity of expressing their views upon the proposal made by four out of the five directors upon the suggestion of Mr. Tomlison, their engineer, that they should proceed to Parliament for further powers. Mr. Tomlison submitted his report, and after a long discussion it was resolved that application should be made to Parliament for carrying it into effect.

PORTISHEAD DISTRICT WATER COMPANY.—The half-yearly meeting was held on the 29th ult., when the directors reported that the first half year's working of their undertaking had been very encouraging. The springs and headings had throughout the summer yielded an abundant supply of water of excellent quality. Services had been put into the public works, into all new buildings, and into the majority of the best residences in Portishead, and the number of consumers was steadily extending. The assignment to the company of the works belonging to Mr. Chilcott, and of his rights of supplying over the Woodhill estates, had not yet been completed, but the terms of purchase had been settled by reference to the arbitration of three eminent surveyors, and they had made their award. The works for supplying the St. George's and Pill districts had also been postponed, pending the conclusion of some negotiations affecting the mode of distribution; but it was not expected that this delay would be much longer protracted. The agreement for the three years working and maintenance came into actual operation only when the supply extended over the entire area included in the contract. The directors had therefore thought it best to arrange with the lessees for working under the agreement on an equitable modification of its terms until the revenues of the Woodhill, St. George's, and Pill districts became available. The terms of this interim agreement were such as to leave for the half year a balance of revenue for division equal to 1½ per cent. on the subscribed capital. The directors had every hope that, before the next half-yearly meeting, the completion of the supply over the districts named, and the opening of the new dock and the works and establishments connected therewith, would enable them to present a still more satisfactory report. The report was adopted, and the dividend recommended therein was declared.

LIVERPOOL NEW WATER SUPPLY.—A meeting of the Conservators of the Severn Fishery was held at Worcester on Thursday last—Lord Northwick presiding. The superintendent of the upper district in his report said: "The Liverpool water supply surveyors have been engaged this autumn on the Verniew, Banw, and Tanat, with the object of supplying Liverpool with water from one or more of those streams. The nature of the scheme not having yet been made public, I am unable to report fully what the effect is likely to be on the fisheries of the Severn. I hear, however, that a reservoir some five miles long is to be formed by damning up the Verniew at the foot of the mountains at Llanwddyn, which would cut off the whole of the supply of that river, except four small brooks. The dam across the valley will be so high that it will submerge the whole village of Llanwddyn, including the church. As in a dry summer I have seen the millstream on the Verniew, half a mile above the mouth of the Banw, take every drop of water to supply the one wheel, leaving the river bed dry, should the above scheme be carried out it seems to me that the river throughout its whole length would in the summer be dry, except in the pools, and so destroy all fish life, certainly all spawn and young fish. It is also rumoured that a reservoir will be formed at Llanwddyn, on the Tanat, to supplement the supply. As the three rivers above named are the chief breeding streams of the Severn salmon, I need not speculate as to what effect the cutting them off—or rather allowing the fish to spawn in them, the ovæ of which will never come to maturity—would be to the Severn fisheries. No doubt there would be plenty of water for the fish to spawn in during the winter, but as the summer advanced the fry would be killed by the diversion of the water from the rivers." Upon this report being read, it was remitted to the executive committee of the board to obtain all the information possible on the subject, and report at a future meeting.

QUALITY OF THE NEWCASTLE-ON-TYNE GAS.—The following are the results of Mr. John Pattinson's examination for the past month of the quality of the gas supplied to the borough by the Newcastle-upon-Tyne and Gateshead Gas Company:—

Date	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
Nov. 2	15·3	6·73	None.
„ 6	15·8	7·51	„
„ 9	15·4	8·49	„
„ 13	16·3	7·85	„
„ 16	15·5	8·87	„
„ 20	15·1	7·96	„
„ 23	14·9	9·06	„
„ 27	15·1	6·70	„
„ 30	14·5	6·99	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

DESTRUCTION OF LEATHER BY GAS.—Mr. G. E. Davis, of Manchester, writing to the *Chemical News* in reference to a communication by Professor Church on the above subject, which recently appeared in that paper, and was copied into the JOURNAL, gives the following results of some experiments commenced two months ago upon the same subject:—"More than two months ago one of my clients brought me some books (cash-books) which had been in daily use from 1855 to 1858 in a large office in Manchester. In the beginning of 1858 they were placed uncovered upon a shelf near the ceiling, where they remained until August, 1877. These books had been strongly bound in rough calf, and had red basil lettering-pieces. Upon knocking the books, the leather from the backs came off as a mixture of dust and small pieces, which were very acid to test-papers. Some of the leather carefully scraped from the back was treated with hot water, when it yielded a substance more nearly resembling india-rubber than anything else I have ever seen; this, though, only when wet, for when dry the mass was very brittle, and easily powdered. The aqueous solution contained—

Combined SO_3	2·847 per cent.
Free SO_3	1·920 „

The red basil lettering-piece was next examined, and found not altered much in strength, though it had suffered somewhat. The leather on digestion with water had evidently undergone but little change, as the pieces retained their shape; the aqueous solution contained—

Combined SO_3	0·99 per cent.
Free SO_3	0·87 „

The piece of leather underneath the lettering-piece was next examined, as it was thought that the lettering-piece would have acted as a filter, and kept back the SO_3 from the leather beneath it. It was very strong, though perhaps, not quite so strong as new leather, and, when treated with water, the filtrate contained—

Combined acid	0·39 per cent.
Free acid	0·76 „

Now, knowing that all bookbinders use alum in the paste, and that rough calf is tough to work, and, therefore, the paste is often put on in excess and allowed to soak in, it was thought advisable to examine another book in rather a different manner. The back was scraped off and treated as before; part was boiled with soda, when it yielded 1·32 per cent. of ammonia.

Combined acid	3·46 per cent.
Free acid	2·18 „

The red basil lettering-piece gave—

Ammonia	1·28 per cent.
Combined acid	0·87 „
Free acid	1·04 „

Here it will be seen that the ammonia is in excess of the acid necessary to form a sulphate; but it must be remembered that all lettering-pieces were in those days glaired over with 'glaire,' or white of egg. A large piece was cut from the side of the book, and this side was not freely exposed to the air during the 20 years it remained on the shelf; therefore it only received the products of combustion due to the circulation of air through the pile of books. This piece from the side gave—

Ammonia	0·46 per cent.
Combined SO_3	1·65 „
Free SO_3	0·64 „

I am now repeating these experiments upon new leather, the results of which I will communicate when finished."

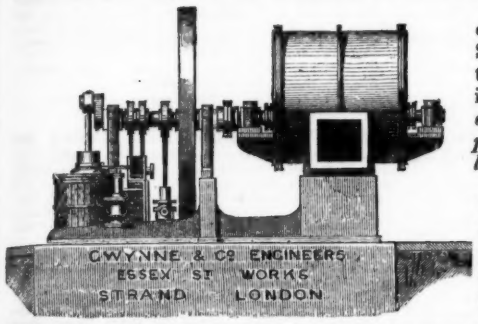
Share List of Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. GOLDING, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	NAME.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	9 0 0	20—24
5000	20	Bahia (Limited). .	20 0 0	2 0 0	10–11xd.
1000	20	Do., do., redeem.	20 0 0	7 10 0	..
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	..
40000	5	Bombay (Limited).	5 0 0	7 10 0	7–7¼xd.
10000	5	Do., fourth issue.	4 0 0	7 0 0	5–5⅛
14000	20	British (Limited) .	20 0 0	10 0 0	39—41
7500	20	Cagliari (Limited).	20 0 0	5 0 0	15½—16½
5500001.	Sk.	*Commercial* . . .	100 0 0	10 0 0	191—194
70000	100	Do., 7 per cent. .	..	..	138—142
20000	20	Continental Union.	20 0 0	6 0 0	19—20
20000	20	Do., new	12 10 0	6 0 0	⅛ds–¼pm
10000	20	Do., preference .	20 0 0	7 0 0	25—27
75000	Sk.	*Crystal Palace District*	100 0 0	10 0 0	195—200
125000	Sk.	Do., 7 per cent. .	100 0 0	7 0 0	145—150
50000	Sk.	Do., preference .	100 0 0	6 0 0	138—142
23405	10	European (Limited)	10 0 0	10 0 0	17—18
12000	10	Do., new shares.	7 10 0	10 0 0	6—7pm.
35405	10	Do., new shares .	5 0 0	10 0 0	3⅛–4¼pm
40948401	Sk.	*Gaslight & Coke* A.	100 0 0	10 0 0	188—192
1000001.	Sk.	Do. B.	100 0 0	4 0 0	85—90
50000	10	Do. 5 per ct. pref. conv., 4th issue.	10 0 0	5 0 0	6½–7½pm
50000	10	Do. do., 5th do. .	2 0 0	5 0 0	5½–6½pm
2000001.	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	205—215
3000001.	„	Do. D do. do. .	100 0 0	10 0 0	205—215
1650001.	„	Do. E do. do. .	100 0 0	10 0 0	205—215
300001.	„	Do. F 5 do. do. .	100 0 0	5 0 0	105—110
600001.	„	Do. G 7½ do. do. .	100 0 0	7 10 0	150—160
1300001.	„	Do. H	100 0 0	7 0 0	138—142
6200	5	Georgetown, Guiana	5 0 0	5 0 0	..
5000	10	Hong Kong (Lim.)	10 0 0	10 0 0	18—20
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	18—19
10000	10	Do., new	8 0 0	10 0 0	6½—7½
1500	10	*Wandsw. & Putney*	10 0 0	9 10 0	93–95xd.
1500	10	Do.	10 0 0	7 10 0	11–12
1500	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
26000	5	*West Ham*	5 0 0	10 0 0	8–9
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	154—159
1800000	100	East London . . .	100 0 0	6 0 0	159—161
8000	50	Grand Junction . .	50 0 0	5 0 0	80—83
5840	25	Do., ¼ shares . .	25 0 0	5 0 0	40—41
2160	25	Do., new ditto; max. div., 7½ p.c.	25 0 0	5 0 0	33—34
547960	100	Kent	100 0 0	8 0 0	202—205
970	100	Lambeth	100 0 0	6 5 0	155—160
1161	100	Do., max., 7½ p.c.	100 0 0	6 5 0	152—157
442	100	New River	100 0 0	7 0 0	320—350
4475	100	Do.	85 0 0	7 0 0	280—300
400000	100	Do., deb. sk., 4 p.c.	100 0 0	4 0 0	103—105
3036	100	Southwrk. & Vauxh.	100 0 0	4 0 0	108—112
1296	100	Do., pref. stock .	100 0 0	5 0 0	114—117
	100	Do., D shares . .	100 0 0	4 0 0	107—111
	100	Do., 4½ preference	100 0 0	4 10 0	110—114
	100	Do., new ordinary	.. ..	4 10 0	..
1600	100	Do., new ord. No. 1	40 0 0	4 10 0	..
12172	61	West Middlesex . .	61 0 0	6l. p.sh.	138—141

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

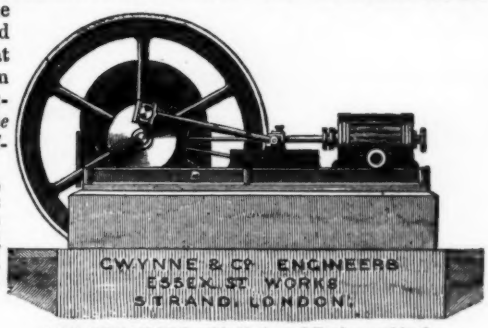
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure.
Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, **GWYNNE & CO.**, Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.
☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes*

NOTICE OF REMOVAL.

D. BRUCE PEEBLES & CO.

Beg to announce that they have REMOVED to their New Premises,

TAY WORKS, BONNINGTON, EDINBURGH,

To which all communications should now be addressed.
May 30, 1877.

THE AMERICAN GAS-LIGHT JOURNAL.

A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
Subscriptions at $3.50 per annum, post paid, to Great Britain, may be made direct by forwarding Post Office Money Order or Draft to the above address. Rates of advertisement, $2.00 an inch. Special rates for larger spaces.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

THE Author of the Paper signed "Tempora Mutant," contributed for Mr. Stewart's Prize on the subject, "Is it Possible to do without the Aid of Gasholders," &c., is requested to communicate with the Secretary, WM. MACKENZIE, Gas-Works, DUNFERMLINE.

GAS MANAGER.

WANTED, a practical Man to undertake the sole management of a small Gas-Works. Will have to collect gas-rents, and attend to the coal trade. Address, with testimonials, stating salary required, Mr. W. ROBINSON, Sedbergh, YORKSHIRE.

WANTED, Orders for Samples to test the superior Silkstone, Wigan, and other Gas Coals and Cannel on Sale by G. J. EVESON, Gas Coal and Cannel Contractor, BIRMINGHAM.
N.B.—Prices on personal application, or by post or telegram, on shortest notice, and prompt delivery.

WANTED, by a Young Man, the son of a Gas Engineer, a situation as ASSISTANT in a large Gas-Work, or as Manager of a smaller one. Is a good draughtsman, has a knowledge of chemistry, and is quite competent to take charge of a work. Can be well recommended.
Address No. 415, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

WANTED, a Working Manager for a small Gas-Works, making about 3 million cubic feet per year. Must understand carbonizing, fitting, and main laying, and be able to drive a small engine for pumping water. A night stoker will assist during the winter months.
Applications, stating qualifications, age, and where previously employed, to be sent in candidate's own handwriting, stating wages required, to Mr. CHARLES TOMLISON, Hadley House, Rotherham, YORKSHIRE.
One who is also a plumber preferred.

WANTED, a Situation as Manager of a small Gas-Works. Ten years experience.
Address No. 422, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a steady, competent Man as Meter Inspector, Gas-Fitter, and Main and Service Layer. One able to do smith's work preferred.
Apply, stating age, wages required, and with testimonials or references, to the MANAGER, Gas-Works, Malton, YORKSHIRE.

WANTED, the Address of Gas Companies who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." Price £6 for first thousand. Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, a respectable man as Gas-FITTER for interior and exterior work. Must be a man of experience, and have a knowledge of service laying. Wages, according to ability, from 24s. to 28s. per week.
Apply, by letter, addressed No. 420, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FARINGDON GAS-WORKS.

WANTED, at once, a man who understands his business thoroughly, to undertake the WORK and MANAGEMENT of the above concern, including the taking of meters and collection of accounts. Liberal wages, with house on the premises, and good garden. Must be well recommended.
Apply to Mr. JOHN HUNT, Clerk to the Gas Company, Faringdon, BERKS.

BOROUGH GAS-WORKS, WIGAN.

GAS PLANT FOR SALE, as follows:—
One Vertical Double-action EXHAUSTER, by Baker and Valliant; capacity 40,000 ft. per hour. Only been in use six years.
One Vertical Double-action EXHAUSTER, by Musgove; capacity 25,000 ft. per hour.
Two Single-flued BOILERS, 16 ft. long by 5 ft. diameter, with valves and steam-pipes complete. These Boilers have very recently undergone thorough repair, and have been working at a pressure of 50 lbs. to the square inch.
Also a quantity of RETORT-FITTINGS, all equal to new, but have been replaced by others of larger dimensions. The lot will be sold cheap.
Apply to J. G. HAWKINS, Engineer, Gas-Works, WIGAN.

ON SALE—One Station-Meter, to pass 1000 cubic feet per hour. Almost new. Will be sold cheap.
Apply to J. HALL, Gas-Works, St. Helen's, LANCS.

TO GAS COMPANIES & LOCAL AUTHORITIES.

FOR SALE, 150 Second-hand Cast-iron Octagon STREET-LAMP PILLARS, in good condition, price 15s. each.
Apply to E. MORRIS AND SON, Ironmongers, EASTBOURNE.

GAS PLANT FOR SALE.

FOUR Purifiers, 10 ft. square, with centre valve, 10-in. connections, and lifting apparatus complete, all in good working order, the removal of which is required for extensions.
Apply to the ENGINEER Gas and Water Works, BIRKENHEAD.

GAS PLANT FOR SALE, suitable for Small Works:—
Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.
Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

FOR SALE,

6000 TONS OF PURE NATURAL

"HYDRATED PEROXIDE OF IRON"

For GAS PURIFICATION.

For price and particulars apply, by letter, to No. 421, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

GAS AND WATER WORKS TO BE LET.

TO BE LET ON LEASE, for a term of years, the Milford Haven Gas and Water Works, Pembrokeshire.

The Works are fitted up with every requisite, and are in full operation.

Possession may be had on the 31st of December next, when the present Lessee's term expires.

Apply to the CLERK of the Milford Improvement Commissioners, Commissioners Offices, MILFORD HAVEN.

TO GASHOLDER BUILDERS.

THE Elsecar, Wentworth, and Hoyland Gas Company are prepared to receive DESIGNS and TENDERS for the erection of a GASHOLDER, with Columns, Girders, &c., 60 ft. in diameter, on their works at Elsecar.

Design, with tender and specifications, to be sent to the Secretary, Mr. Thomas Wigfield, 41, High Street, Rotherham (properly endorsed), on or before Monday, the 24th day of December next.

The Directors do not bind themselves to accept the lowest or any tender, nor to make any allowance for designs, but will return, free of expense, such as are not accepted, immediately after inspection by the Directors, to the respective owners.

THOS. WIGFIELD, Secretary.

Rotherham, Nov. 30, 1877.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, & OTHERS.
TENDERS FOR TAR AND LIQUOR.

THE Directors of the Shipley Gaslight Company are prepared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR for One year, from the 1st of January, 1878.

The Company will load, f.o.b the Leeds and Liverpool Canal at Shipley, or into the contractor's carts on the Works.

The quantity of Coal carbonized in twelve months is 8000 tons.

Any further particulars may be obtained on application to the Secretary.

Sealed tenders to be sent in (stating separately price per ton for Tar and Liquor, endorsed "Tender for Tar, &c.") on or before the 8th of December, 1877.

JNO. WILCOCK, Secretary.

Gas-Works, Shipley, Nov. 14, 1877.

GAS PLANT AND 15-TON HAND CRANE FOR SALE.

THE Trustees for the District and Harbour of Maryport have FOR SALE the following ARTICLES, lately used at the old Gas-Works, which were recently purchased by the Trustees, namely—

D-shaped Hydraulic Main, 1 ft. 6 in. by 1 ft. 6 in.

Fourteen 6-in. Ascension Pipes, with arch pipes all complete.

Fourteen Mouthpieces, 23 in. by 15 in.

Four Doors and Frames.

One Set of Condensers, 36 pipes, 7-in. inlet and 7-in. outlet.

One 4000-light Meter (makers, W. & B. Cowan, Edinburgh) with 6-in. connecting bye-pass valves, gauge, clock, and tell-tale, all in good order, equal to new.

Two Governors, 6-in. inlet and 6-in. outlet, all complete.

And also a 15-ton Hand Crane complete.

Offers to be sent to the undersigned on or before the 29th of December next.

JOHN BARWISE, Clerk to the Trustees.

Harbour Office, Maryport,
Nov. 21, 1877.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 27th inst.

JULIAN GOLDSMID, Esq., M.P., the Chairman.

Resolved unanimously—"That the Report upon the affairs of the Association now read be received, adopted, and entered on the minutes."

Resolved unanimously—"That a dividend of £2 per share, and a bonus of 10s. per share, be declared upon the 56,000 shares of the Association, for the half year ended the 30th of June last; and that the said dividend and bonus be payable, free of income-tax, on and after the 15th of December next."

Resolved unanimously—"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair this day."

Upon the motion of the Chairman (Mr. Julian Goldsmid, M.P.), a vote of thanks was also given to Mr. G. W. Drory, the General Superintendent of the affairs of the Association on the Continent, and to the Agents, Engineers, and other Officers of the Association.

ALBERT F. JACKSON, Secretary.

(By order of the Board.)

No. 30, Clement's Lane, Lombard Street,
London, Nov. 28, 1877.

BAHIA GAS COMPANY, LIMITED.

NOTICE is hereby given that an EXTRAORDINARY GENERAL MEETING of this Company will be held at the Company's Office, 10, Coleman Street, London, on TUESDAY, the 11th day of December, 1877, to confirm the Special Resolution, passed at the Ordinary Half-Yearly General Meeting of the Company, held on the 27th day of November, 1877, which Resolution was in the words following, viz.:—

"That the 77th Article of Association of the Company be altered by omitting therefrom the words:

"'Until the sum of £20,000 authorized to be raised by Clause 74 shall have been fully raised, without any further authority than a Resolution of the Board of Directors.'

"And by inserting in lieu thereof the words:

"'With the sanction of a Resolution passed by the Company in General Meeting.'"

And at the same Meeting, if the above-mentioned Special Resolution be confirmed, the following Resolution will be proposed, viz.:—

"That the Directors be and are hereby authorized, in pursuance of the 77th Article of Association of the Company, as altered by the Special Resolution confirmed this day, to borrow from time to time, for the purposes of the Company, a sum or sums of money, so as no more than the sum of £10,000 raised under this authority be owing at any one time."

By order of the Board,

ALFRED J. HEAD, Secretary.

10, Coleman Street, London, E.C., Nov. 28, 1877.

TO GASHOLDER MAKERS.

THE Directors of the Malton Gaslight and Coke Company invite TENDERS for the construction of the INNER LIFT of a Telescopic Gasholder, 84 ft. diameter by 20½ ft. deep.

Drawings and specifications may be seen at the Company's Offices, Malton, Yorkshire.

Tenders to be sent in on or before the 6th day of December, 1877, addressed to the Chairman and Directors of the Company, and endorsed "Tender for Gasholder."

The Directors do not bind themselves to accept the lowest or any tender.

HENRY TOBBY, Manager.

Malton, Nov. 15, 1877.

MICHAEL & WILL'S GAS AND WATER SUPPLY.

This day is published, second edition, 8vo., 25s., cloth,

THE LAW RELATING TO GAS AND WATER: comprising the Rights and Duties, as well of Local Authorities as of Private Companies, in regard thereto, and including all Legislation to the close of the last Session of Parliament. Second Edition. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esqs., Barristers-at-Law.

London: BUTTERWORTHS, 7, FLEET STREET, Her Majesty's Law Publishers.

TO GAS ENGINEERS, MANAGERS, &c.

HILL and CO., Gas Engineers and Architects, 11, Appach Road, BRIXTON RISE, S.W., prepare Designs for the construction of New Gas-Works, Bridges, and Roofs, or for the remodelling and extension of existing Works. Also provide Drawings of all kinds of Gas Apparatus and Plant. Drawings, Tracings, and Specifications copied for Engineers and Contractors.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

MR. HENRY GORE,

CONSULTING GAS ENGINEER AND SCIENTIFIC REFEREE.

OFFICE: 98, FLEET STREET, LONDON, E.C.

Plans and Specifications for every description of Gas Work. Specialities for Works in tropical climates. Arbitrations and Parliamentary Inquiries attended. Mr. Gore has had upwards of 30 years experience as a Gas Engineer in connection with Works in nearly all parts of the World.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,

30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

TO GAS COMPANIES.

WE beg to call attention to our ImPROVED STREET-LAMP REGULATORS with brass cones and burners. Sample, 3s.; carriage paid. Special Steatite Burners for Street-Lamps, 8s. per gross. Quotations for quantities. Street-Lamp Regulators, Wet and Dry Meters repaired.

Messrs. TINDALL AND TELLING, Gas Apparatus Works, 74, Wynford Road, Penton Street, LONDON, N.

JOHN SPENCER,

VULCAN WORKS, WEST BROMWICH, & 97, CANNON ST., LONDON,

Manufacturer of Every Description of

TUBES & FITTINGS,

Plant, Tools, Stores, and all requisites for Gas and Water Works: Gasholders, Purifiers, Scrubbers, Roofing, Sashes, Retort Fittings, Grids, Socket-Pipes, Lamp-Posts, Wheelbarrows; Brasswork, Chandeliers, and Gas-Fitters Tools; Liquor-Pumps, Valves; Clay Retorts and Fire Goods, &c.

Now ready, price One Shilling, No. 13 (to be continued Monthly) of

A TREATISE ON THE SCIENCE & PRACTICE OF THE Manufacture and Distribution OF COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,

OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

NOTICE.

THE GAS & WATER COMPANIES DIRECTORY, 1878.

(WATER SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,

8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

E. & W. H. HALEY,

General Ironfounders and Makers

OF

CAST-IRON GAS AND WATER PIPES.

Sizes 1¼ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

PATENT HYDRAULIC LIFTS, CRANES, HOISTS,

Suitable for Lifting Purifier-Covers, &c.

S. CLAYTON & CO., BRADFORD, YORKS.

ECONOMY IN THE PRODUCTION OF GAS.

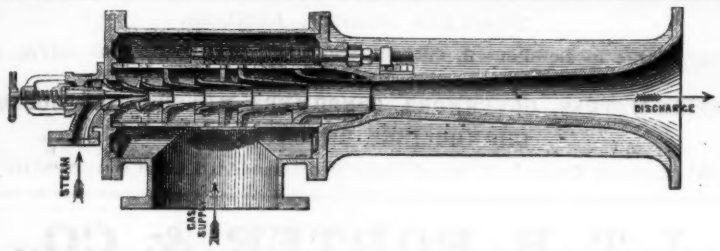
PLUTONIC CEMENT,

For Jointing and Repairing Retorts and Ovens *in* action and *out* of action.

A Pamphlet on the advantages of the above, with modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer,

CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,

OR TO

GERALD J. TUPP, 8, John Street, Adelphi, W.C.,

LONDON,

SOLE AGENT FOR ENGLAND AND WALES.

J. & J. BRADDOCK,

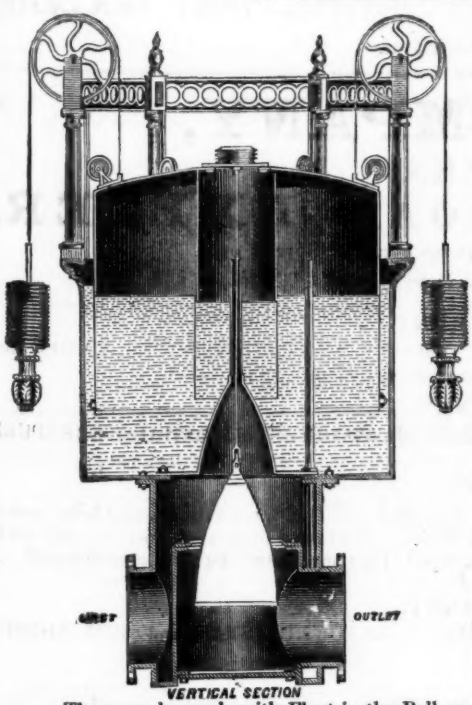
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. Guest and Chrimes, Rotherham.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. Guest and Chrimes, Foundry and Brass Works, Rotherham.

CATHELS'S Improved Retort-Settings. Guaranteed to heat and wear well, with great economy of Fuel.

Coloured lithograph copies of Working Drawings of Beds of One to Seven Retorts (so clearly arranged and fully shown as to be easily understood by any retort setter or bricklayer) having been made of these valuable settings, they can now be supplied with detailed Specification immediately on receipt of orders.

Apply to Mr. Thos. Newbigging, Consulting Gas Engineer, 5, Norfolk Street, Manchester.

HOPKINS, GILKES, & CO.,

Limited,

MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.

Plain, Turned and Bored, and Coated.

CAST-IRON RETORTS.

Castings for Gas-Works of every description.

EXHAUSTERS.

London Office: 25, Laurence Pountney Lane.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,

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Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAY.

Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

Mr. ROBERT DEMPSTER, Sen.,

CONSULTING GAS ENGINEER,

Of Messrs. Robert Dempster and Sons, Rose Mount Gas Engineering Works,

ELLAND, near HALIFAX,

May be consulted on all matters connected with Valuations, Arbitrations, and Parliamentary Applications connected with Gas-Works. Our R. D., Sen., having been engaged on extensive Arbitration Cases, which, combined with his experience in Construction and Contracting, his knowledge of Engineering and Valuations, is both extensive and reliable.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. Romans has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

Analysis and Prices forwarded on Application.

GAS COMPANIES

AND

LOCAL BOARDS

Requiring New Street-Lamps are recommended

A **KEEN'S PATENT**

DOUBLE-CLIP

STREET-LAMP.

A great improvement on the old-fashioned 14-in. Lamps.

They have been sold to various Gas-Works throughout the country and abroad, and the highest satisfactory testimonials are given as to their superiority.

B

For particulars of price, &c., apply to

WILLIAM KEEN, Sole Proprietor and Manufacturer, Robertson Street, HASTINGS.

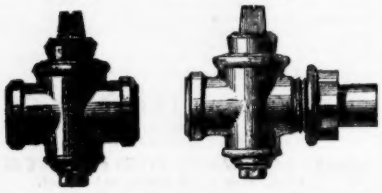
BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:
SHORT STREET, LAMBETH, LONDON.

JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

J. T. B. PORTER & CO.,
GAS ENGINEERS & MANUFACTURERS,
IRONFOUNDERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

FLETCHER AND MURPHY,
GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;
Manufacturers of
IMPROVED CONSUMERS WET GAS-METERS
IN CAST-IRON CASES,
THE UNVARYING WATER-LINE GAS-METER,
AND
IMPROVED DRY GAS-METERS;
STATION-METERS OF ALL SIZES, with PLANED JOINTS;
GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.
And all kinds of Experimental Gas Apparatus.

WILLEY & COMPANY,
GAS ENGINEERS,
WORKS: COMMERCIAL ROAD, EXETER,
INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF
EVERY DESCRIPTION OF GAS APPARATUS.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.
PATTERN-BOOKS and PRICE LISTS furnished.

☞ PLEASE NOTE THE ADDRESS—
GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

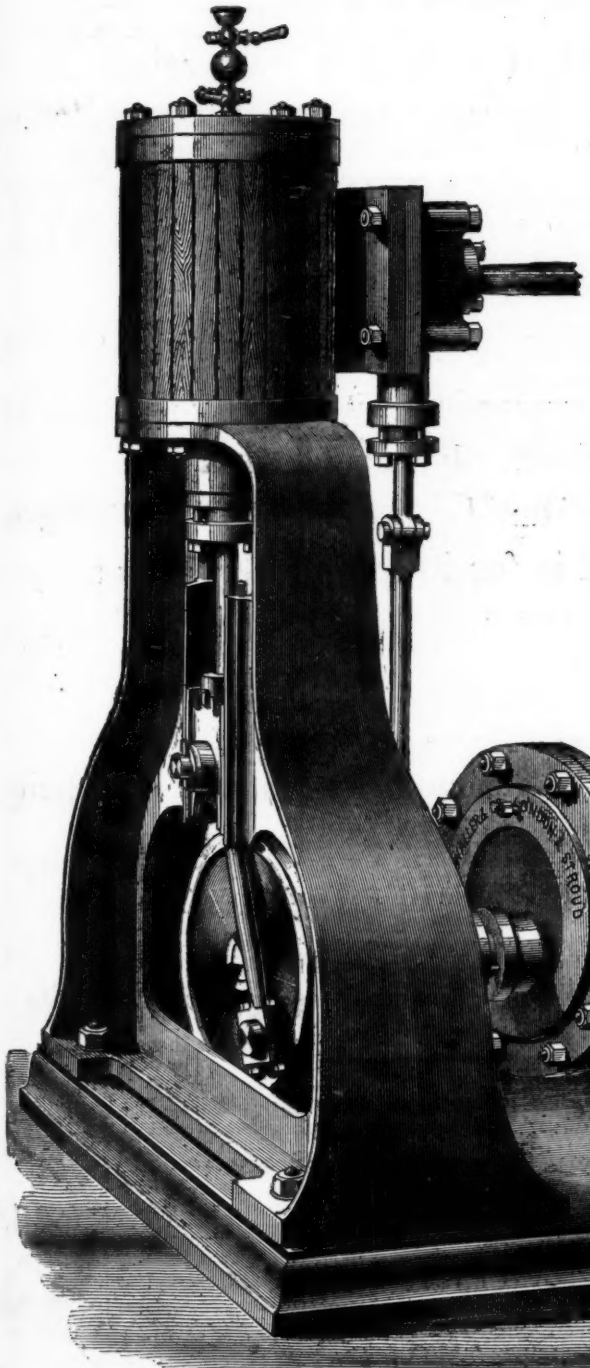
THE WIGAN COAL & IRON COMPANY,
LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

GEORGE WALLER & CO.,
GAS AND HYDRAULIC ENGINEERS.



BEALE'S IMPROVED

PATENT GAS-EXHAUSTERS
AND
COMBINED ENGINES,
ON ONE BASE-PLATE.

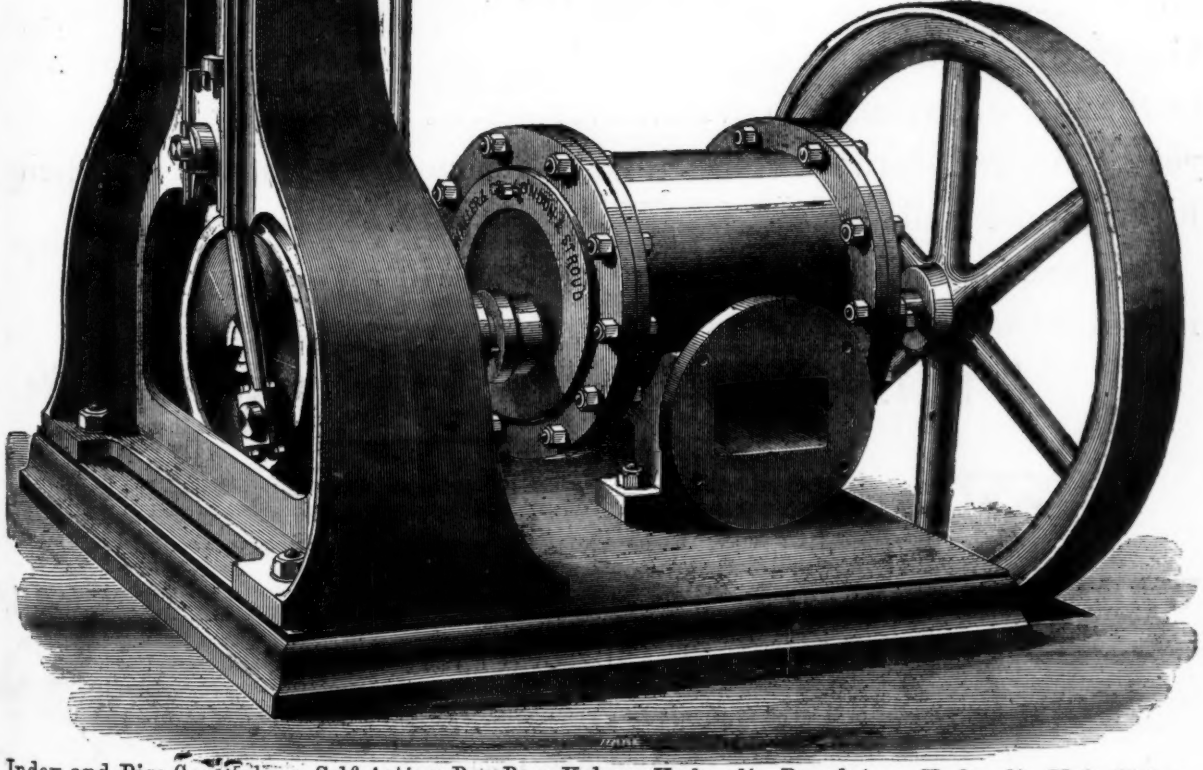
This arrangement is entirely novel, and has been designed by G. W. & Co. to occupy very small space, the Base-Plate of a 5000 feet per hour being

only 3 feet square.

The Exhausters have wrought-iron spindles, and are extra large for driving at moderate speed. They are easily fixed, and are

Complete on one Base-Plate.

Sizes from 2000 to 10,000 feet per hour are kept in Stock.



Index and Disc Gas-Valves, Self-Acting Bye-Pass Valves, Hydraulic Regulators, Hydraulic Main Valves, Pumps, Coke Barrows, Retort Tools, &c., always in Stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, LONDON, S.E.

REDUCTION
OF
"UNACCOUNTED-FOR GAS."

Of the three essential conditions for this purpose—sound pipes, accurate measurement, and well-regulated pressure—the last two are covered by the following Patents held by our firm, viz.—

THE WARNER AND COWAN METER
(THE ONLY METER SUITABLE FOR TROPICAL CLIMATES)
AND
THE FOULIS STATION AND DISTRICT GOVERNOR.

The former is the ONLY THOROUGHLY RELIABLE METER IN EXISTENCE, being practically unvarying in capacity under all changes of water-line, and entirely free from any "compensating" or other extraneous mechanism.

The FOULIS GOVERNOR is for its purpose equally simple and efficacious, while it is the smallest, most compact, and cheapest Governor yet constructed. It may be placed under ground anywhere in the line of main, and covered over just as an ordinary syphon, and yet be under entire control, with a delicacy of action and simplicity hitherto unequalled.

The combined use of these inventions will materially assist in the important work now so generally carried on for the reduction of the

"UNACCOUNTED-FOR GAS."

W. & B. COWAN,
ORIGINAL LICENSEES AND MANUFACTURERS OF
WARNER & COWAN'S SELF-REGULATING GAS-METERS,
SOLE LICENSEES AND MANUFACTURERS OF
FOULIS'S STATION AND DISTRICT GOVERNOR,
(ESTABLISHED 1827,)

CHURCH STREET, MILLBANK STREET, **LONDON, S.W.** | FENNEL STREET, **MANCHESTER.** | BUCCLEUCH ST. WORKS, **EDINBURGH.**

JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

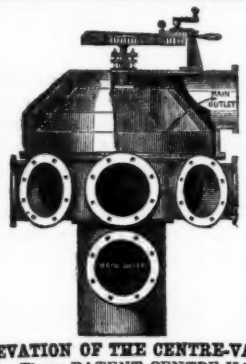
HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

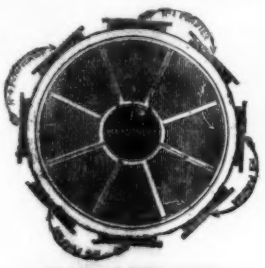
LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C. | GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

C. & W. WALKERS'
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.

PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ⅜ to 12 inches at GLASGOW.

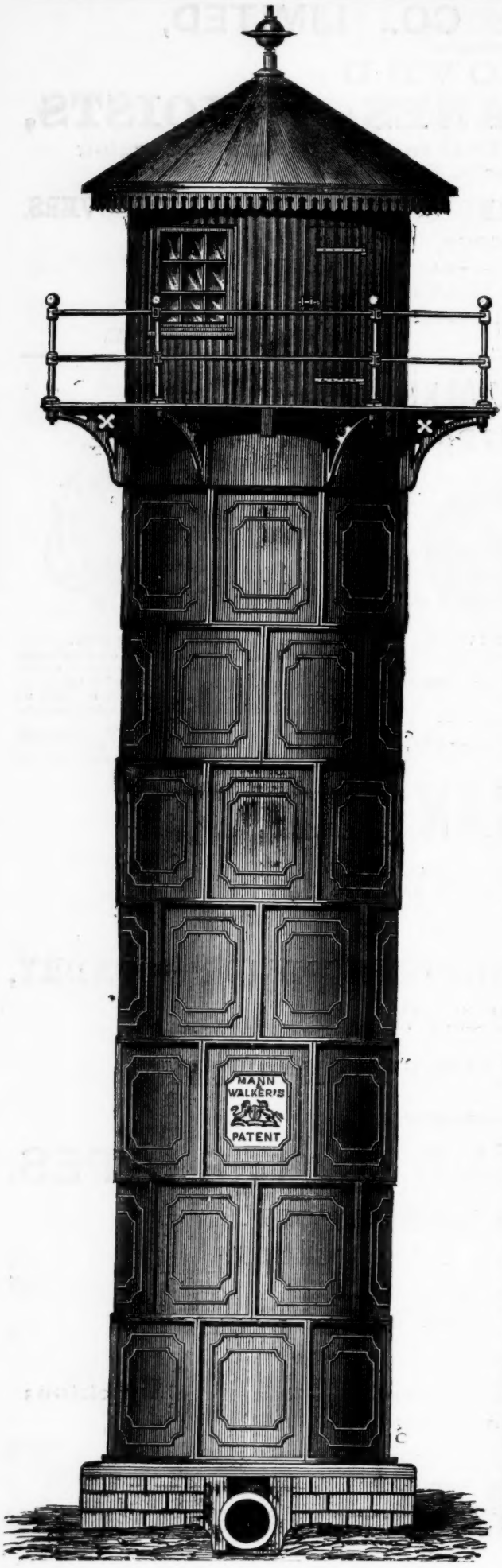
„ 1½ to 10 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 15s. from Glasgow.

AGENTS FOR LONDON AND THE SOUTH OF ENGLAND:

THE THAMES BANK IRON COMPANY, UPPER GROUND STREET, LONDON, S.E.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

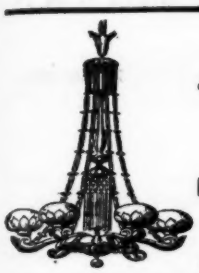
They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,
148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
SOLE AGENT FOR
THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.
MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.
ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,
35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.,
PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.
FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS,
BY THEIR
PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—
BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

TO GAS COMPANIES AND THE TRADE.

J. DEFRIES & SONS,

MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN
LIGHTS VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
WORKS: LONDON AND BIRMINGHAM.

GAS MOONS,
Cut and Engraved, of the newest designs
GAS REFLECTORS
In Silver and Glass
GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.

Chief Offices: Temple Buildings, 50, New Street, Birmingham.

London Offices: 6, Great Winchester St. Buildings, E.C.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,594 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

ADDISON POTTER,

WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

GRIRDROD'S PATENT
PORTABLE PIPE SCREWING
MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,
Brassfounders, Gauge Injector and Tool Makers,
ALBION WORKS, SALFORD,
LANCASHIRE.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

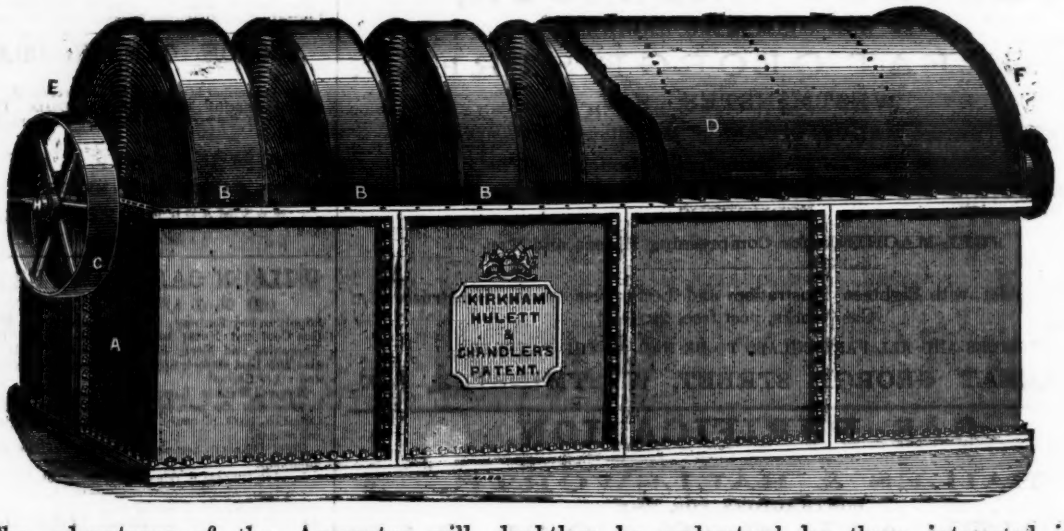
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows:—

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

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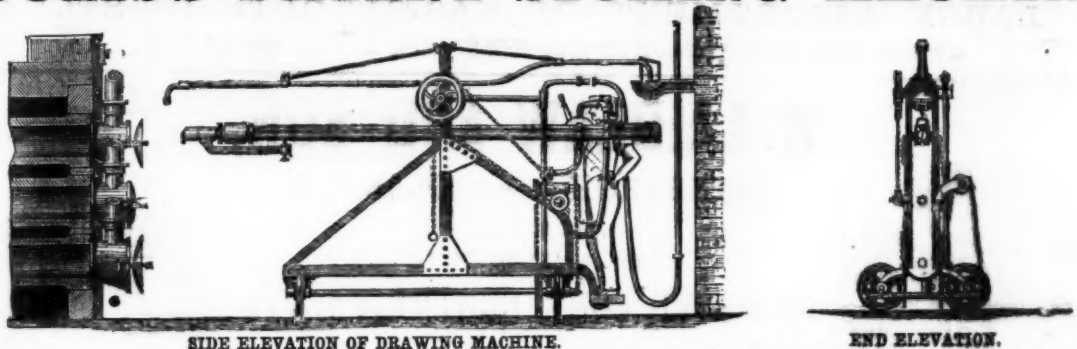
Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(*The Charging Machine will be Illustrated in next week's Advertisement.*)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;
Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

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THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

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(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 120,000 in action.

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OF EVERY DESCRIPTION.

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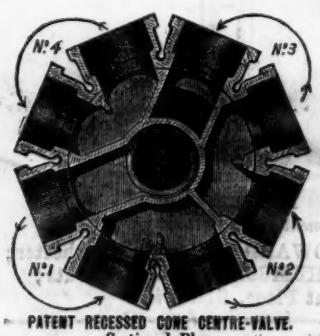
PATENT

RECESSED CONE CENTRE-VALVES,

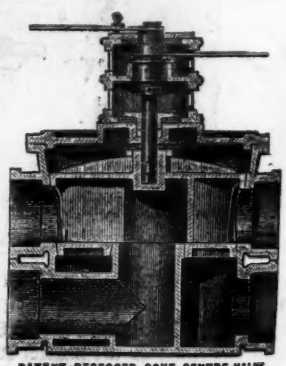
Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.



PATENT RECESSED CONE CENTRE-VALVE.
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Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

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